# NEW REALITIES OF THE RUSSIAN COAL SECTOR: FOCUS ON KUZBASS

INSIGHTS REPORT

CLIMATE Strategies

# COLOPHON

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**Cover Photo:** Getty Images Signature Yang Wen Shuang via canva.com.

**Cite As:** Anna Korppoo, Platon Sakharov, and Klava Tsvetava (2023). New Realities of the Russian Coal Sector: Focus on Kuzbass. Climate Strategies.

**Note:** Climate Strategies commenced a project on Russian Energy Transitions in December 2021. Following the start of the Russian War in Ukraine in February 2022, we determined to continue the project to maintain insights in the rapidly evolving Russian energy sector. This research was co-authored by a group of experts in fossil fuel transitions and climate policy. However, a number of our experts appear under pseudonyms to protect their identity, as expressing critical views on Russian government policies incur personal risk.

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# 1. INTRODUCTION

**Since Russia started its unprovoked war in Ukraine on 24th February 2022, the world – and Europe in particular – has entered a new geopolitical reality, one difficult to imagine only a year previous. The repercussions of these developments are driving changes in Russia's export-dependent coal sector, with Western sanctions depriving Russia of a significant share of its previous markets. The EU and Japan, which have now joined the sanctions against Russian coal imports, accounted for 33.4%, or some 70 MT, of Russia's coal exports in 2021.[1] According to the Bank of Russia, most coal-mining companies cut production in 2022 because they were unable to redirect their exports from Europe to alternative destinations.[2] However, when the EU lifted the planned sanctions on coal transport in autumn 2022, Russian coal exporters established transport routes through European ports, sending coal around the world and significantly softening the impact of EU sanctions on imports of Russian coal.**

The idea of phasing-out coal production, in Russia and elsewhere, is nothing new. Prior to the war in Ukraine, the EU had scheduled a coal phase-out to counter accelerating climate change. As a result, 14 out of 27 EU countries either do not use coal or are planning to phase it out by 2030, and further six are planning to do so during 2030–2040. However, demand for Russian coal had not declined much prior to February 2022, as phase-out had been scheduled for later in the decade, after the EU's phase-out of domestic coal was completed. In many other parts of the world, coal demand has not yet peaked. It continues to grow in non-OECD Asia Pacific countries and is declining only slightly in the OECD Asia-Pacific sphere. Even though Chinese coal demand had probably peaked during the first half of the 2010s, it accounted for over 60% of global demand in 2020 (IEA data). When global coal prices hit all-time high in 2022, Russian coal producers were able to cover longer-distance transport costs and offer price discounts. These alternative markets and higher prices mitigated the impacts of EU coal sanctions in 2022.

This report focuses on Kuzbass (Kemerovo region) as an outstanding coal-producing region responsible for over 55% of total coal production in Russia. The region is highly dependent on coal-related industries, export supplies and revenues, and sensitive to external geopolitical and economic shocks. Although the coal sector makes an insignificant contribution to Russia's national economy (a mere 1% in 2020), coal mining accounts for 27.2% of the gross regional product of Kemerovo (Kuzbass). The sector provides many relatively well-paid jobs, thus contributing to social and political stability. The Russian coal sector was privatized in 1990s, but coal companies have retained such social responsibilities as investing in local infrastructure. Moreover, as the coal-miner strikes in the 1990s helped to fuel the dissolution of the USSR and further economic and political reforms,[3] Russian leaders are keenly interested in the survival of the coal-mining sector for political reasons.[4] These economic, social, and political impacts are particularly salient in the Kuzbass region, given its heavy dependence on the coal sector. By focusing on the regional impacts in Kuzbass, we can provide a targeted analysis of the impacts of the EU coal embargo on business models and livelihoods in Kuzbass – indeed, the region appears particularly sensitive to the sanctions. This contextually specific research has global relevance through coal exports, which have

1. Russian customs statistics: http://stat.customs.ru/.
2. Bank of Russia (2022). Regional economy: commentaries of the Bank of Russia main branches, September 2022, URL: http://www.cbr.ru/Collection/Collection/File/42330/report_16092022.pdf.
3. The miners' strikes in Donbass (neighboring regions of Russia and Ukraine) in mid-1990s even rose the political slogans of uniting Ukrainian areas with Russia.
4. A. Korppoo et al. (2021). The Russian coal sector in a low-carbon world: Prospects for a Coal Transition? Insights Report by Climate Strategies. URL: https://climatestrategies.org/wp-content/uploads/2021/10/Russian-coal-sector-prospects-for-coal-transition_Nov21.pdf.

# 1. INTRODUCTION

been significantly redirected towards alternative markets, as well as greenhouse gas (GHG) emissions the sector generates.

Examining the recent geopolitical developments influencing the Russian coal sector, we ask:

- What are the implications of sanctions (financial, technological, export, divestments, etc.) on the coal sector and related sectors in Kuzbass?
- Are there alternative markets for Russian coal?
- What are the likely outcomes of declining coal exports for Kuzbass region – in particular, from the social, economic, environmental and GHG emissions perspectives?
- Based on the above, what are alternative development paths for the Kuzbass coal sector?

Section 2 introduces the Kuzbass coal sector and discusses its importance in the regional economy. Section 3 details the sanctions on the Russian coal sector imposed by the EU, G7 and other countries, and contextualises the changing status of Russian coal production and exports. Section 4 provides an overview of alternative markets for Russian coal. Section 5 outlines possible scenarios for the Kuzbass regional economy as a result of the Western sanctions on coal, including the impacts of the sanctions on GHG emissions from the coal-mining sector. Section 6 offers scenarios that explore the future impact of sanctions on coal regions and Russian emissions.

# 2. COAL SECTOR IN KUZBASS PRIOR TO THE WAR

## 2.1 KUZBASS GEOGRAPHICAL AND ECOLOGICAL CONTEXT

The Kemerovo region, also known as Kuzbass, in Western Siberia is located 3,500 km from Moscow (Figure 1) and is home to 1.8% of the Russian population (2.6 million people).[5] The administrative centre of the region is the city of Kemerovo. The gross regional product (GRP) of Kemerovo region contributed 1.1% of the total GRPs of Russian regions in 2020.[6]

Kuzbass possesses huge amounts of coal. There are over 121 billion tons of known coal reserves (fully confirmed by on-site geological investigations) and 256 billion tons of resources of coal (deposits that still require on-site investigation and confirmation) are concentrated in Kemerovo region.[7] These are mainly hard, energy, and metallurgical coals of varying quality, mostly in line with international standards due to high caloric values and low sulphur and ash content, attractive to both domestic and international consumers. Geologically, about 25% of these coal reserves are low-cost and relatively simple and safe to extract. Proven hard coal reserves amount to 54.5 billion tons.

However, the ecological situation in Kuzbass is very dramatic. The regional capital, Kemerovo, features on the list of Russian cities with very high levels of air pollution.[8] The share of coal in the regional total primary energy supply is 97%.[9] Coal mining and combustion cause substantial air pollution and related health risks in Kemerovo, Novokuznetsk, Leninsk-Kuznetsky and other industrial centres of the region. In 2018, the total mortality rate of the working-age population in Kuzbass was the second highest in Russia, and the cancer mortality rate was 17% higher than the average in Russia. In 1990–2018, life expectancy at birth in the region was on average 3.14 years lower than the Russian average. Despite the dangers of protesting publicly, since 2015 there have been at least 50 protest actions, mainly by residents of villages near coal-mining sites in Kuzbass – however, without resulting in environmental improvements.[10]

Figure 1: Map Illustrating Location of Kuzbass

5. Federal State Statistics Service in Kemerovo region – Kuzbass (2022). Kuzbass in numbers (2022). URL: https://kemerovostat.gks.ru/books_statistic (in Russian).
6. Federal State Statistics Service in Kemerovo region – Kuzbass (2022). Kuzbass in numbers (2022). URL: https://kemerovostat.gks.ru/books_statistic (in Russian).
7. Coal of Russia, 2017. https://nedradv.ru/nedradv/ru/resources?obj=ab05b068239ede80d3dd35cf406d13b0 (In Russian).
8. Decree of the Russian Government #1852-r of 07 July 2022 aimed at halving emissions of hazardous pollutants by 2030.
9. Decree of Kemerovo city administration #1538 of 6 June 2022 on approval of Fuels and Energy balance of Kemerovo in 2021 and forecast for the period 2022–2025. https://kemerovo.ru/sfery-deyatelnosti/gorodskoe-zhkkh/toplivno-energeticheskiy-balans-goroda-kemerovo/.
10. Korppoo A. et al. (2021). The Russian coal sector in a low-carbon world: Prospects for a Coal Transition? // Insights Report by Climate Strategies. URL: https://climatestrategies.org/wp-content/uploads/2021/10/Russian-coal-sector-prospects-for-coal-transition_Nov21.pdf.

# 2. COAL SECTOR IN KUZBASS PRIOR TO THE WAR

## 2.2 REGIONAL RELIANCE ON COAL

Kuzbass is highly dependent on coal, with the coal industry accounting for 8.6% of the labour force (99,300 employees) in 2021.[11] However, this industry has experienced previous shocks and contractions as a result of changing markets. In the aftermath of the Soviet collapse, the unemployment rate in the Kemerovo region doubled between 1992 and 1998. Hidden unemployment grew rapidly as well. In all the mining towns, the majority of those laid off were coal mine workers. Many young specialists and scientists left in search of jobs in other regions.[12] The population of the region dropped rapidly – by 3.8% by 2000 and by 14.7% by 2020.[13]

After the turn of the century, however, both energy and coking coal production in the region expanded (Figure 3) as Kuzbass' hard-coal exports increased 2.3 times in weight and 4.1 times in value between 2005 and 2021 (Figure 4). Despite a 5% decline in production due to low coal prices, by 2021 Kuzbass accounted for 56.3% of all Russian coal (243.1 MT), including 70.1% of coking-grade (metallurgical) coal (71.7 MT) and accounted for 62.8% of total coal exports (135.1 MT)[14] – significantly higher than 1990 coal production in the region (Figure 2).

The economy of the Kemerovo region is heavily dependent on the coal-mining sector and on coal prices. Between 2017 and 2020, coal mining accounted for almost all shipped raw materials. As a result, volatile coal prices have a major impact on the Kuzbass economy. Between 2017 and 2018, when coal prices were high, some 35% of the GRP of Kuzbass originated from coal mining. Declining prices in 2020 brought this share to less than 20% (see Figure 5) but then increased to 39.7% in 2021.[15]

The Federal Coal Development Programme foresaw economic diversification of the Kuzbass region for 2018–2021, with coal production shifting to Eastern Siberia and the Far East, due to their significant reserves of coal and proximity to potential markets in Asia. Thus, Kuzbass' share of Russian coal production was estimated to decline to 45.6% by 2030[16] – and this was prior to any production changes caused by the war in Ukraine or the resultant sanctions. Already then, it was estimated that this development would reduce coal employment from 139,200 in 2018 to 37,000–50,600 by 2035 (a 64%–73% reduction) due to the quadrupling of labour productivity.[17] However, in 2020, the Center for Strategic Research (a think-tank close to the Russian government) forecast a lower reduction (25–35% decline by 2035). Regardless, as coal-sector employees and their families are entitled to significant social benefits, these developments would have impacted communities in terms not only of re-employment and retraining, but also of wider social services.

Despite discussions on diversifying the region, coal mining was estimated to have generated about 60% of all tax revenues of the Kuzbass budget in January–April 2022, compared to the annual average of 32% in the period 2018–2021. Kuzbass was highly coal dependent in early 2022, due to the high coal prices.[18] In 2022, 152 coal-mining and processing companies were operating in the Kuzbass region, employing over 91,000 people.[19] Four large companies (see Table 1) produce most of the coal. Currently, many new coal mining facilities are being planned and constructed in the region. This has the potential to raise total coal production by 20%, further increasing regional reliance on coal.

11. Territorial body of the Federal State Statistics Service for the Kemerovo region , Average annual number of people employed. in the economy by main type of economic activity, https://kemerovostat.gks.ru/folder/38679 (in Russian).
12. Solovenko, I (2010) Rail war' in Kuzbass in 1998: stages, features and results, Bulletin of Tomsk State University 3(11), pp. 103-9 (In Russian).
13. Compared to 1991 figures; Rosstat (2003) Russia's Regions, Rosstat (In Russian): Moscow; Rosstat (2021) Russia's Regions, Rosstat: Moscow (In Russian).
14. Ministry of Coal Industry of Kuzbass (2022) The coal industry of Kuzbass in numbers. URL: https://mupk42.ru/ru/industry/ (in Russian).
15. Kemerovostat (2023) Sectoral structure of gross value added in the Kemerovo region - Kuzbass from 2016 to 2021, https://kemerovostat.gks.ru/folder/38633 (in Russian).
16. The Russian Government (2020) Programme for coal industry development in Russia for the period up to 2035. URL: http://government.ru/docs/39871/http://government.ru/docs/39871/ (in Russian).
17. The Coal Sector Development Strategy forecasts an increase of coal production per employee from 3046 t per annum in 2018 to 13100-13200 t per annum in 2035.
18. ACRA (2022) ACRA affirmed the credit rating of the Kemerovo region – kuzbass at A-(RU) by changing the outlook to 'positive' and the regional bonds – at A-(RU). URL: https://www.acra-ratings.ru/press-releases/3321/.
19. See footnote 14 *supra*.

# 2. COAL SECTOR IN KUZBASS PRIOR TO THE WAR

Figure 2. Total Coal Production in Kuzbass 1990–2022, MT[20]

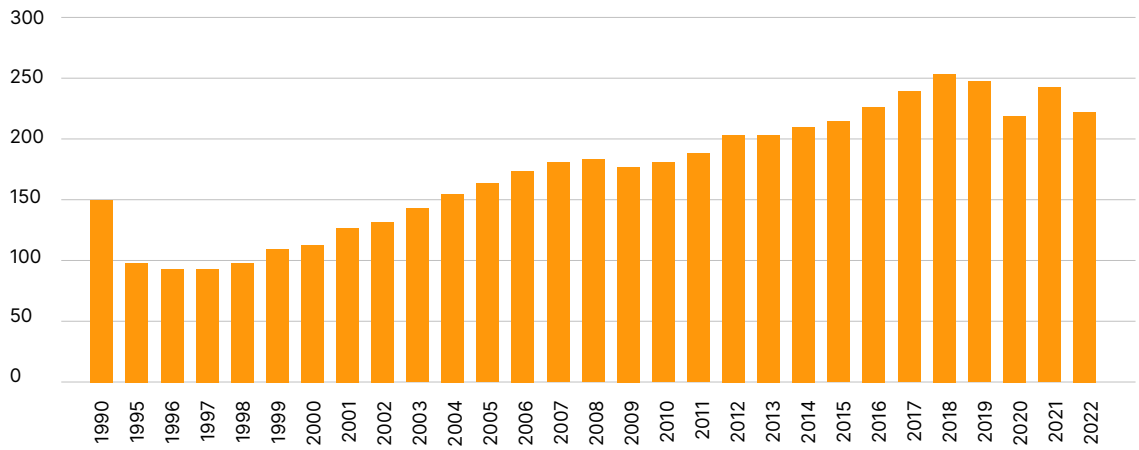
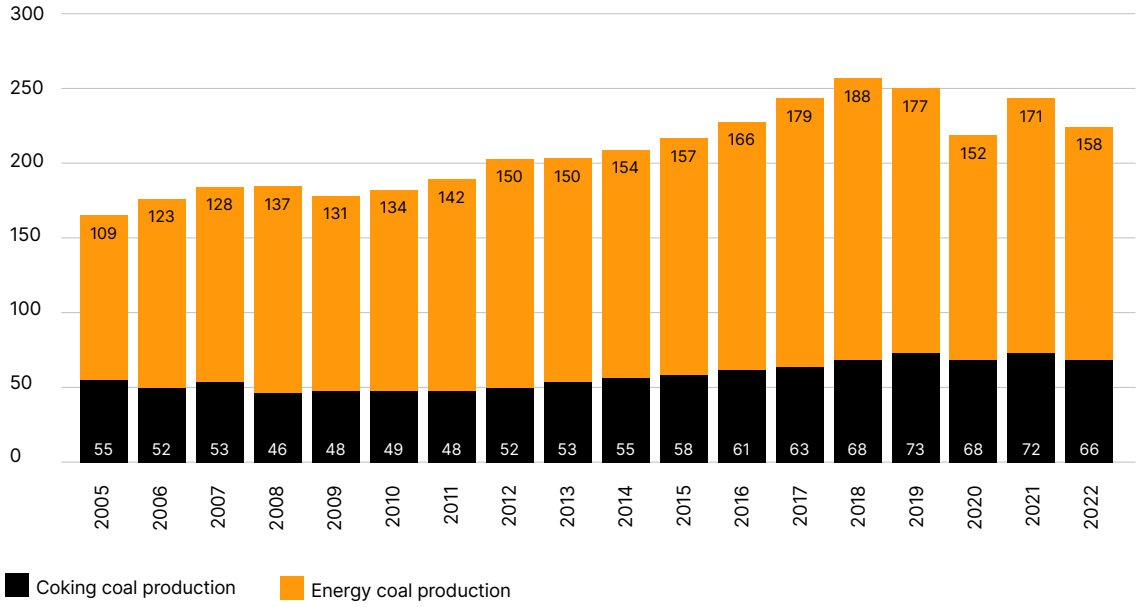



Figure 3. Coking and Energy Coal Production in Kuzbass 2005–2022[21], MT




20. Federal State Statistics Service (2022). Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204# (in Russian).
21. Federal State Statistics Service in Kemerovo region – Kuzbass (2022). Official statistics. URL: http://service.kemerovostat.gks.ru/bgd/EJEGOD/Main.htm (in Russian); and Ministry of Coal Industry of Kuzbass (2022). Coal industry. Indicators. URL: https://mupk42.ru/ru/industry/pokazateli/2022-god.php (in Russian) for 2021.

# 2. COAL SECTOR IN KUZBASS PRIOR TO THE WAR

Figure 4. Value and Volume of Hard-Coal Exports, and Average Actual Hard-Coal Export Prices in Kuzbass, 2005–2021[22]

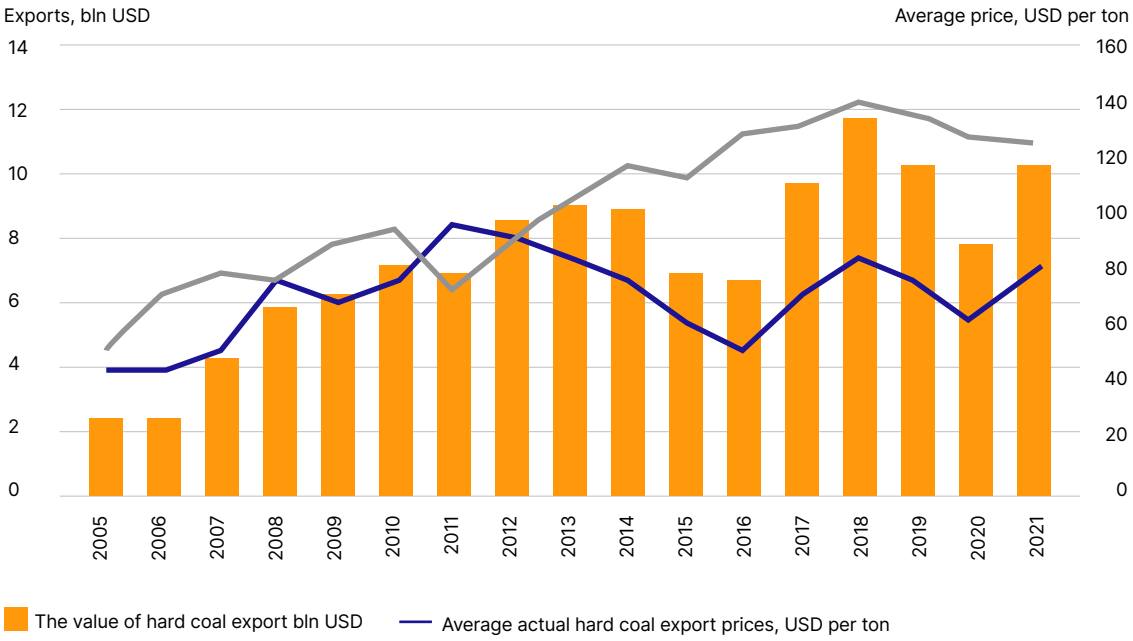
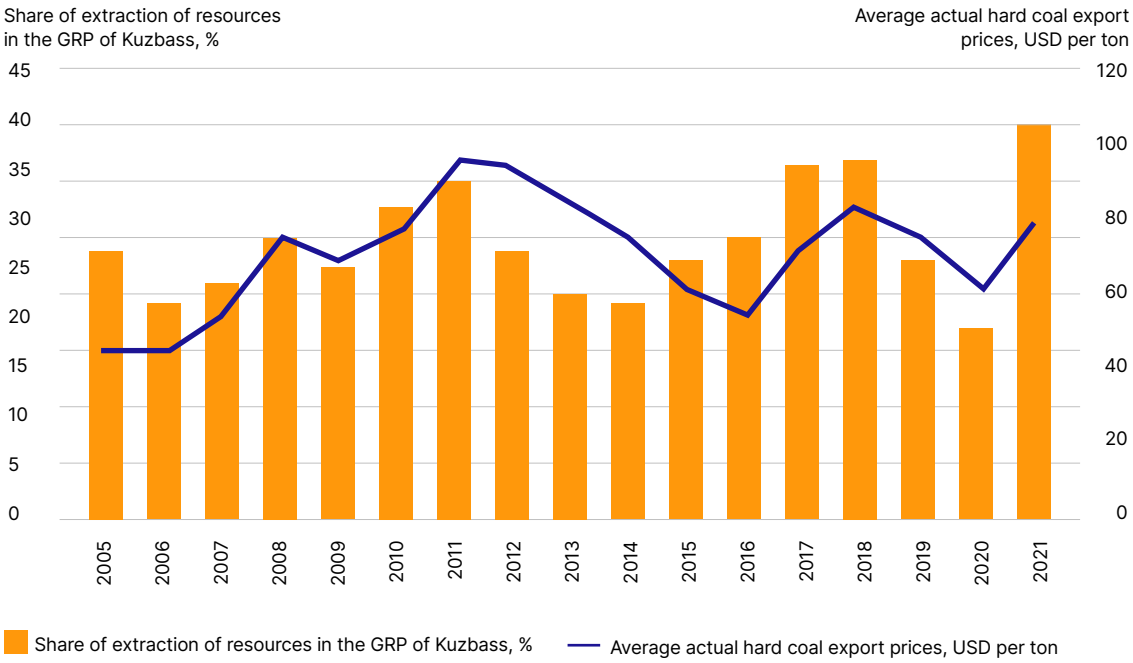



Figure 5. Share of Extraction of Resources in Kuzbass GRP (%), and average actual hard-coal export prices, USD per ton, 2005–2021[23]




22. Federal State Statistics Service in Kemerovo region – Kuzbass (2022). Official statistics. URL: http://service.kemerovostat.gks.ru/bgd/EJEGOD/Main.htm (in Russian); values for 2021 calculated by the authors on the basis of Federal Customs Service (2022), Export and import of the Russian Federation by goods. URL: https://customs.gov.ru/folder/502 (in Russian).
23. Federal State Statistics Service in Kemerovo region – Kuzbass (2022). Official statistics. URL: http://service.kemerovostat.gks.ru/bgd/EJEGOD/Main.htm (in Russian).

# 2. COAL SECTOR IN KUZBASS PRIOR TO THE WAR

Table 1: Main Coal-Producing and -Processing Companies Operating in Kuzbass

Source: The State Report “On the state and use of mineral and raw resources in the Russian Federation in 2016 and 2017”. Coal of Russia, 2017. https://nedradv.ru/nedradv/ru/resources?obj=ab05b068239ede80d3dd35cf406d13b0 (In Russian)

| Kuzbass coal producer | Owner | Annual capacity | Market |
|---|---|---|---|
| JSC Uk Kuzbassrazrezugol | JSC UGMK | Coal: 44 MT<br>Processing: 38 MT | 66% to export |
| SUEK | SUEK | Coal: 30 MT<br>Processing:10 MT | 66% of final products to export |
| SDS Ugol | SDS Ugol | Coal: 30 MT<br>Processing: 20 MT | Mostly export |
| Raspadskaya Coal Company | Evraz Group S.A. | Coal: 22 MT | Metallurgical plants and other users in Russia and CIS |
| Southern Kuzbass Coal Company | PAO Mechel | Coal: 9 MT | Vertically integrated mining and metals company: coal production partly used within the company |

# 3. SANCTIONS AND RUSSIAN COAL EXPORTS

## 3.1 SANCTIONS ON COAL EXPORTS

In April 2022, as part of the fifth package of sanctions against Russia, the EU banned coal imports from Russia, starting from 10 August that year. The EU sanctions against the Russian coal sector are the most influential to date against this sector, as the EU had purchased 23% of Russia's coal exports in 2021. These EU sanctions are expected to lead to annual export revenue losses of over EUR 8 billion (USD 8.7 billion) for Russia.[24] Related technical or financial assistance and brokering services are also banned. In August 2022, the EU prohibition was extended to EU companies transporting or providing insurance and financial services to Russian coal. However, this ban was lifted in September 2022, 'to combat food and energy insecurity around the world.'[25&26] The EU's dependency on Russian coal has been high: 37.8% of its coal imports originated from Russia in 2021.[27]

In April 2022, the UK announced its Russian fossil-fuel embargo, pledging 'to phase out the use of Russian oil and coal by the end of 2022'.[28] Russia accounted for 27% of British coal imports in 2021.[29] The UK accounted for only about 1% of Russia's coal exports, but strengthened the impact of its embargo by prohibiting the direct or indirect provision of technical assistance, financial services, funds or brokering services related to Russian coal and coal products.[30]

From August 2022, Switzerland banned coal purchases and imports from Russia, as well as the transport and provision of related services (including financial services).[31] Switzerland does not import coal from Russia for its own use, but a full 75% of Russian coal exports were traded in Switzerland, where there have been 240 companies specializing in marketing, transporting and financing coal, many of them serving Russia. Further, there are 52 coal companies in Switzerland, 12 of which are directly controlled by Russian citizens.[32] Given their focus on restricting support services, the Swiss sanctions are aligned with sanctions in the EU.

Outside of Europe, Japan has pledged to stop purchasing coal from Russia, without disclosing an exact date for the complete ban.[33] However, some Japanese as well as South Korean utility companies have indicated that they are no longer buying Russian coal.[34&35] The USA banned all imports of Russian fossil fuels in March 2022, although it had been importing relatively insignificant amounts of Russian coal. However, the US sanctions also prohibit 'new US investment in Russia's energy sector' and 'financing or enabling foreign companies that are making investment to produce energy in Russia'.[36] Moreover, in March, April and June 2022, Australia, Norway and Canada, respectively – all insignificant buyers – banned imports of Russian coal.[37]

24. European Commission (2022). Ukraine: EU agrees fifth package of restrictive measures against Russia. URL: https://ec.europa.eu/commission/presscorner/detail/en/IP_22_2332.
25. European Commission (2022). Import, purchase & transfer of listed goods. Frequently asked questions – as of 19 September 2022. URL: https://finance.ec.europa.eu/system/files/2022-09/faqs-sanctions-russia-listed-goods_en.pdf.
26. ReedSmith (2022). The EU U-turns on global transfer restrictions of Russian coal, fertilisers and other goods. URL: https://www.reedsmith.com/en/perspectives/2022/09/eu-u- turns-on-global-transfer-restrictions-of-russian-coal-fertilisers
27. Eurostat data https://ec.europa.eu/eurostat/databrowser/view/DS-045409__custom_3379809/default/table?lang=en.
28. UK Government (2022). Policy Paper. British energy security strategy. URL: https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy.
29. UK Parliament (2022). Imports of energy from Russia. URL: https://commonslibrary.parliament.uk/research-briefings/cbp-9523/#:~:text=The%20UK%20imported%20no%20fossil,the%20year%20to%20June%202022.
30. UK Legislation (2022). The Russia (Sanctions) (EU Exit) (Amendment) (No. 14) Regulations 2022. URL: https://www.legislation.gov.uk/uksi/2022/850/made.
31. Federal Council of Switzerland (2022). Ordinance on measures related to the situation in Ukraine as of 4 March 2022 (Status as of 27 April 2022). URL: https://www.lenzstaehelin.com/fileadmin/user_upload/newsflash/2022_04_27_Swiss_Ordinance_re_Situation_in_Ukraine_dd_4_March_2022_clean__9223312.2__9245510.1_.pdf.
32. Public Eye (2022). Switzerland, Putin's coal-fired power plant. URL: https://www.publiceye.ch/en/topics/ukraine/commodity-trading-with-russia/switzerland-putins-coal-fired-power-plant.
33. S&P Global (2022). Japan to impose ban on Russian coal imports following G-7 pledge: PM. URL: https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/oil/040822-japan-to-phase-out-russian-coal-imports-with-eye-to-suspend-it-on-g7-pledge-minister.
34. IEA (2022). Coal 2022. Analysis and forecast to 2035. URL: https://iea.blob.core.windows.net/assets/91982b4e-26dc-41d5-88b1-4c47ea436882/Coal2022.pdf.
35. Argus (2022). Japanese LNG buyers shrug off Russian coal ban. URL: https://www.argusmedia.com/en/news/2323317-japanese-lng-buyers-shrug-off-russian-coal-ban.
36. The White House (2022). Fact Sheet: United States Bans Imports of Russian Oil, Liquefied Natural Gas, and Coal. URL: https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/08/fact-sheet-united-states-bans-imports-of-russian-oil-liquefied-natural-gas-and-coal/.
37. Government of Australia, Russia Sanctions Regime, https://www.dfat.gov.au/international-relations/security/sanctions/sanctions-regimes/russia-sanctions-regime; Government of Norway (2022) New sanctions against Russia incorporated into Norwegian law, 29 April 2022, https://www.regjeringen.no/en/aktuelt/new-sanctions-against-russia-incorporated-into-norwegian-law/id2910809/; Government of Canada (2022). Special Economic Measures (Russia) Regulations. SOR/2014-58. URL: https://laws.justice.gc.ca/eng/regulations/SOR-2014-58/FullText.

# 3. SANCTIONS AND RUSSIAN COAL EXPORTS

## 3.2 IMPACTS ON RUSSIAN COAL EXPORTS 2022

Some 41% (85.6 MT) of Russia's 2021 coal-export markets emplaced sanctions on coal imports from Russia as a result of its war in Ukraine.[38] (See Figure 7 and Table 2.) Three out of five main buyers of Russian coal have imposed sanctions, although Japan is yet to implement its sanctions fully as of February 2023, while the amount imported has been declining steadily.

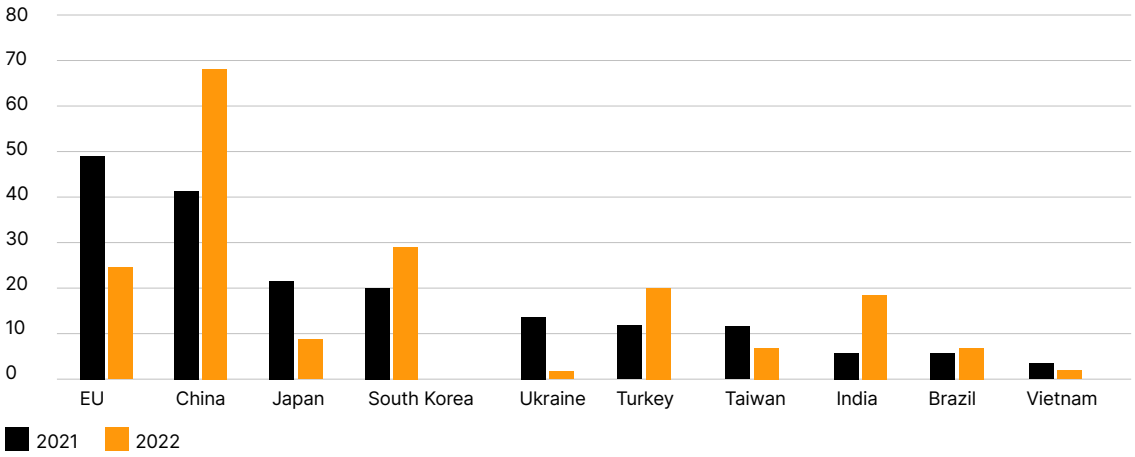
According to Russia's Deputy Prime Minister Alexander Novak, total coal exports from Russia declined by 7.6% in 2022 in comparison to the same period in 2021.[39] However, this decline was largely offset by the 6.8% increase in domestic consumption due to the decline in hydropower generation.[40]

Exports from Kemerovo, which produces more than half of Russian coal, declined by 14% during 2022 compared to 2021.[41] It is difficult to verify the accuracy of Russian official data but the limits to rail transport and reliance on thermal coal for exports (most of the coking coal produced is used by local industry), which also declined by 13.9% during January-November 2022,[42] provide a point of triangulation, underlining the vulnerability of Kuzbass in comparison with other coal-exporting regions.

The Russian government stopped publishing monthly export statistics as of February 2022, but coal exports can be deduced by analysing customs statistics in importing countries. The Russian government has also published some relevant data in the media. Due to the significant increase in demand from some Asian buyers, total imports, accounting for 88.4% of Russia's coal imports in 2021, remained the same in 2022 compared to 2021 (see Fig. 6).[43]

During this period, Ukraine stopped buying Russian coal, the EU and Japan cut their imports. Demand also declined in Taiwan, Brazil and Vietnam, possibly due to increased global coal prices (see next section) as well as transport and logistical challenges. However, some countries, among them India and China, and to some extent Turkey and South Korea, increased their imports of Russian coal, providing alternative markets.

Figure 6. Hard-coal imports from Russia, 2022 in comparison to 2021[44]

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39. Zainullin, E (2022) Russian coal makes its way to the markets, Kommersant 15 November, https://www.kommersant.ru/doc/5667789, (In Russian).
40. TASS 1 February 2023, Russia's coal exports to decrease by up to 10% in 2023, says expert, https://tass.com/economy/1569831
41. The Coal Hub (2022), Coal production in Kuzbass down 8% in 2022, https://thecoalhub.com/coal-production-in-kuzbass-down-8-in-2022.html
42. Sintsova, N (2022) IEA expects a decrease in coal exports from Russia until 2025, Vedomosti 16 December, https://www.vedomosti.ru/business/articles/2022/12/16/955761-snizheniya-eksporta-uglya (In Russian)
43. The lower 2022 total decline in exports can be explained by increased exports during Q4 and markets which are not included in Figure 6
44. Customs statistics / statistics offices of importing countries

# 3. SANCTIONS AND RUSSIAN COAL EXPORTS

Figure 7: Hard-Coal Exports from Russia in 2021, and sanctions resulting from Ukraine war (millions of tonnes)[45]

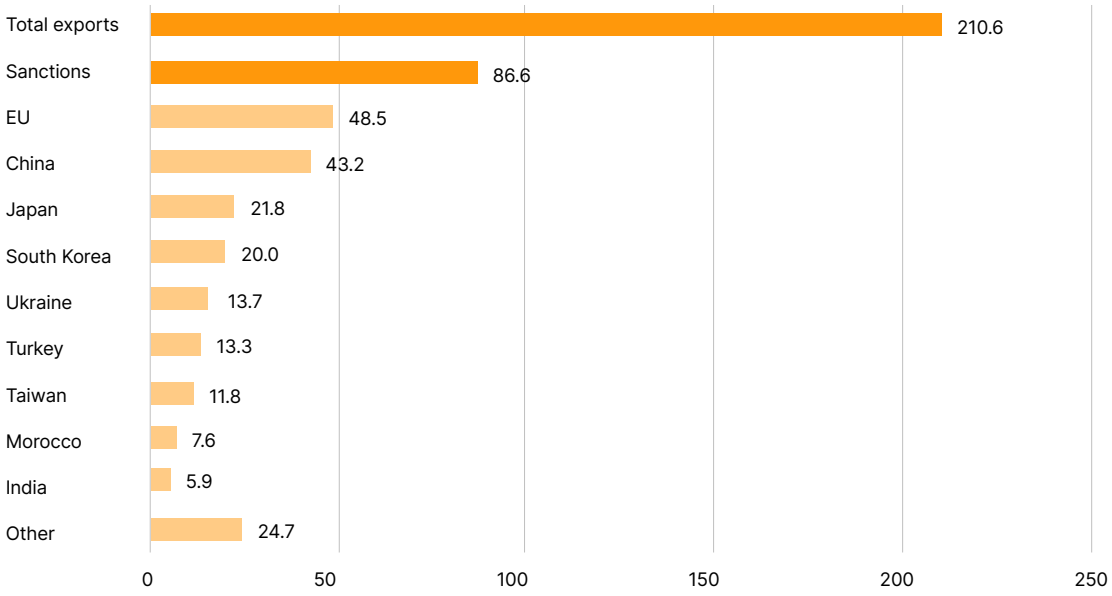



Table 2: Russian Coal Exports Purchased by Key Trade Partners in 2021 (%)[46]

**Countries and country-groups with sanctions are shaded grey.

| | |
|---|---|
| EU | 23.0 |
| China | 20.5 |
| Japan | 10.4 |
| South Korea | 9.5 |
| Ukraine | 6.5 |
| Turkey | 6.3 |
| Taiwan | 5.6 |
| Morocco | 3.6 |
| India | 2.8 |
| Brazil | 2.2 |

| | |
|---|---|
| Vietnam | 1.6 |
| Malaysia | 1.6 |
| Other Asia-Pacific | 1.5 |
| Middle East | 1.3 |
| Other CIS | 1.1 |
| Other Europe | 1.1 |
| Other Africa | 0.7 |
| Other Americas | 0.5 |
| Other | 0.1 |

45. Russian customs statistics: http://stat.customs.ru/.
46. Russian customs statistics: http://stat.customs.ru/.

## 3.3 IMPACTS OF SANCTIONS BEYOND THE COAL SECTOR IN KUZBASS

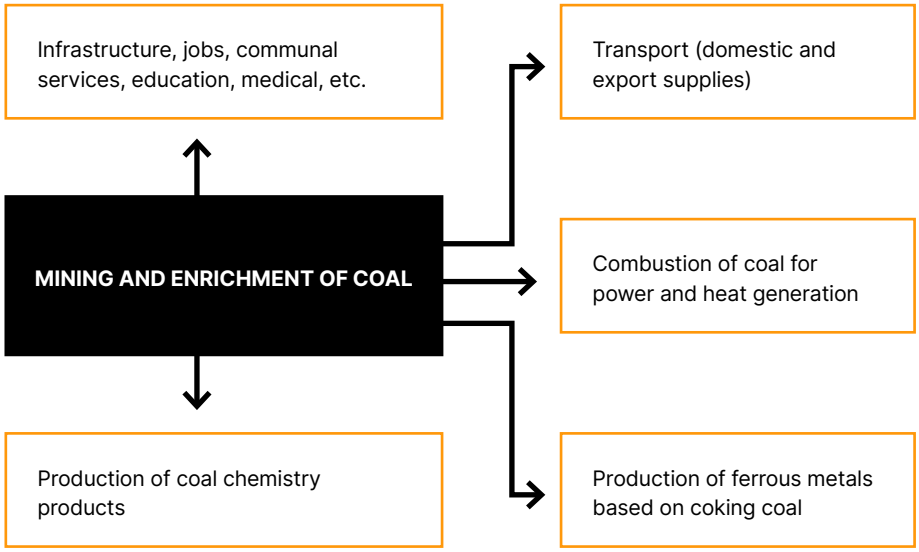
There are various industries related to coal mining in Kuzbass (Figure 8). Social services, including the maintenance of infrastructure, communal services, employment, medical, educational, and other social sectors, are also dependent on coal companies in Kuzbass because of the sector's significant contribution to the regional budget as well as the social responsibilities of the coal companies.

Coal sanctions and other war-related impacts, including those related to EU policies, will have diverse and lasting impacts on coal production and consumption in Kuzbass. In addition to the EU ban on coal, on crude oil (from December 2022) and on oil products (February 2023), steel, iron and steel products (July 2022) are also banned. Moreover, there are some products that cannot be *exported* to Russia from the EU. These include equipment, technology, and services for energy industry; certain types of machinery and transportation equipment; specific goods and technology needed for oil refining; and cutting-edge technology (e.g., high-end electronics and software). These sanctions have had major impacts on industries in Kuzbass, as outlined below.

**Metallurgy** is a major industrial sector in Kuzbass, accounting for 33.1% of total industrial production; it provides significant income and employment.[47] This sector is highly dependent on supplies of coking coal, as well as coal-based electricity produced in the region. In the second quarter of 2022, exports of iron and steel declined by 20%, and domestic consumption also fell. As a result, the leading sheet metal producers (MMK and Severstal) decreased their production capacity load to 62% and 72%, respectively.[48] Metallurgy is a major electricity consumer in the region, accounting for 30% of power demand. Because of its energy intensity, some of the companies own coal mines. Declining metal and aluminium production had led to a reduction in electricity demand, and thus, a significant drop of coal consumption for power and heat generation in the region, as well as reducing power imports from neighbouring regions. In June 2022, the regional **electricity** consumption fell 6.1% compared to June 2021, showing that coal-fired plant production may decrease both in Kuzbass and neighbouring regions as a result of the sanctions.

Sanctions on *Technical Equipment and Financial Services* may impact efforts to improve labour productivity in the Russian coal industry, which is

Figure 8. Main sectors linked to coal mining in Kuzbass




47. There are 14 large ferrous metallurgical plants in the region: 2 full-cycle metallurgical combine plants (West Siberian metallurgical combinate - ZSMK, Kuznetsky metallurgical combinate - KMK); 2 metallurgical plants (Kuznetskie ferrosplavy, Gurievsk metallurgical plant); 2 agglomeration factories (Abagurskaya and Mundybashskaya); and 6 ore-production facilities.
48. Severstal reported that in the first half of 2022 steel production declined by 9% (year to year); MMK reduced production by 9.5%.

two to five times lower than in the North America and Australia. The coal industry is in need of large-scale automatization and robotization, and modern 3-D technologies for modelling and planning geological exploration. High import dependence on technology will affect efforts to modernize Russian coal production. In 2018, the average share of imported equipment was 79% (see Table 3).[49]

Further, the embargos on technical equipment have caused mining companies in Russia to switch to domestic and Chinese equipment. In the spring of 2022, many Russian coal-mining companies reported having a stock of components and spare parts sufficient for uninterrupted production for six months to a year without direct deliveries.[50] However, since then, coal enterprises in the Kemerovo region have experienced difficulties in importing equipment, and critical equipment shocks are likely. This could substantially affect production in the short- and medium-term future.

The lack of access to technology is relevant also to *coal chemistry* in Kuzbass. Prior to 1990 Russia produced over 20,000 types of chemical products from coal and other fossil fuels, which has shrunk to 500–600 product types today. In 2012, the Russian government set the goal of creating a coal-chemistry cluster in Kuzbass. It aimed to use enhanced coal chemistry to increase revenues and reduce the ecological impacts of the coal sector, thereby improving the quality of life in Kuzbass (2020). In May 2022, the Russian government adopted a science and technology programme aimed at developing advanced technologies for, *inter alia*, deep-coal processing in Kuzbass.[52] The long-term (10–15 years) goal was to create a cluster of science-intensive enterprises for small- and medium-scale coal chemistry production, and to export synthetic liquid fuels and polymer materials. However, as ready-to-apply industrial technologies are not available in Russia, the project is unlikely to develop or attract further investment. The technological sanctions will limit Kuzbass' ability to diversify into a more technically advanced coal producer.

Table 3. Import dependency of Russia in coal-mining equipment (%)[51]

| | | |
|---|---|---|
| Highly dependent | Bucket-wheel excavators | 100 |
| | Diesel locomotives | 99.6 |
| | Open-pit loaders | 93 |
| | Shearers | 80 |
| | Bulldozers | 76 |
| Medium-dependent | Shield support | 54 |
| | Tunnelling machines | 40 |
| | Loaders | 48.5 |
| | Single-bucket excavators | 40.4 |
| | Electric locomotives | 65 |
| | Drilling rigs for surface mining | 54 |
| Least dependent | Belt conveyors | 10.8 |
| | Chain conveyors | 6.6 |
| | Mine cars | 0 |
| | Pusher gears | 0 |

49. Russian Government (2020). Programme for coal industry development in Russia for the period up to 2035. URL: http://government.ru/docs/39871/ (in Russian).
50. Bank of Russia (2022). Regional economy: commentaries of the Bank of Russia main branches. April 2022 URL: http://www.cbr.ru/Collection/Collection/File/40943/report_20042022.pdf (in Russian).
51. Rosinformugol, cited by Prokopiev I. (2022). By what means will we mine? Coal of Kuzbass 4(089), July–August 2022. URL: http://uk42.ru/assets/files/IMG/2022/04/UK-2022-04-WEB.pdf (in Russian).
52. Governmental Decree #1144-r of 11.05.2022.

# 4. PROSPECTS FOR ALTERNATIVE MARKETS FOR RUSSIAN COAL

To compensate for the shortfall in demand created by the sanctions, Russian coal producers have sought alternative markets. However, the high costs of production, limits to railway capacity, changing international policies on renewable energy, and the reduction in EU insurance support challenge the ability of Kemerovo and other Siberian regions to meet the increased demand for coal in Asia and other new markets.[53&54] High global prices of coal, which allow discounting prices for Russian coal, have made it possible to find alternative markets for a substantial share of Russian exports, in the short term at least.

## 4.1 CHALLENGES RELATED TO TRANSPORT FOR EXPORT

The eastward transportation capacities of Baikal-Amur Railways (BAM) and Trans-Siberian Railways (Transsib) are limited. Currently, coal represents 40% of cargo transport by the Russian Railways (RZD) monopoly. For many years, coal transport costs were heavily subsidized by RZD and coal suppliers had railway guarantees from Kuzbass to transport coal from the region to ports in the Far East.

However, these subsidies cause financial losses for RZD and reduce the availability of railway facilities for other, more profitable products, such as metals and oil. Starting from 1 June 2022, RZD freight railway tariffs have been indexed by 11%,[55] and from 1 January 2023 by a further 10%.[56] Moreover, from 1 June 2022, the Russian government eliminated the railway transport cost-related subsidies and administrative privileges for the coal companies: thus, coal is losing competition with more profitable products.[57] Because of these additional costs, the loaded tariff for Kuzbass coal delivery to Vanino, Murmansk and Taman increased by 60%, 52%, and 47%, respectively.[58]

The coal companies attempted to compensate for this by proposing that the Russian government should stockpile coal, return reduction factors for coal transport, introduce discounts on RZD tariffs,[59] expand Eastern transport capacity, improve coal-loading capacities and develop infrastructure at key ports and on the River Amur to increase coal exports to China.[60] Some coal mining companies are building private infrastructure to export coal to the East. For example, Elgaugol which operates the largest coal deposit in Russia, will launch a private railway line in 2024 from the Elga coal deposit in Yakutia to the Sea of Okhotsk (500 km) and the Port Elga coal sea-terminal with a capacity of 30 MT.[61]

An embargo on insurance for international coal transportation (currently under discussion in the EU) would create further logistical challenges, given Russia's increased reliance on European ports for coal exports. It is not the lack of demand for coal, but logistical difficulties – in particular, unavailability of bulk carriers with European insurance – hamper the recovery of Russian coal exports;[62] this is also shown by the recent increased use of European ports by Russian coal exporters when the planned EU ban on transport and insurance of Russian coal was lifted.[63]

53. Sintseva, N & Tkachev, I (2022) Carbonhydrate Turn, RBC 20 September, URL: https://www.rbc.ru/newspaper/2022/09/21/6329c3709a79474445b1456f (In Russian).
54. Bank of Russia (2022). Regional economy: commentaries of the Bank of Russia main branches. February 2022. URL: http://www.cbr.ru/Collection/Collection/File/39750/report_03022022.pdf (in Russian).
55. RZD Partner (2022). Coal miners request re-establishment of railway tariff discounts for export destinations. URL: https://www.rzd-partner.ru/zhd-transport/comments/ugolshchiki-prosyat-vernut-skidki-po-zheleznodorozhnomu-tarifu-dlya-eksportnykh-napravleniy/ (in Russian).
56. 8% indexation of tariff compared to 2021, but taking into account an additional 2% indexation in the form of an overhaul allowance. Interfax (2023). Freight railway tariffs in Russia increased by 8% since January 1. URL: https://www.interfax.ru/russia/879442 (in Russian).
57. The reduction factor (0.895) for transporting thermal coal for export and the factor (0.4) for a transportation distance of more than 3.3 thousand km were cancelled. At first a temporary measure, it has now been until the end of 2023. Skorlygina N. (2022). Russian Railways tariffs will increase by 10%, Kommersant 3 November. URL: https://www.kommersant.ru/doc/5651246 (in Russian). Interfax (2023). Freight railway tariffs in Russia have increased by 8% since 1 January. URL: https://www.interfax.ru/russia/879442 (in Russian).
58. RZD Partner (2022). Coal miners request re-instatement of railway tariff discounts for export destinations. URL: https://www.rzd-partner.ru/zhd-transport/comments/ugolshchiki-prosyat-vernut-skidki-po-zheleznodorozhnomu-tarifu-dlya-eksportnykh-napravleniy/ (in Russian).
59. See note 56 *supra*.
60. Kommersant Daily, Russian coal will rise to the surface in Amur, 20 June 2022. A reference to the report of Ministry of Energy of Russia on implementation of the coal industry development program by 2035. https://www.kommersant.ru/doc/5421944 (In Russian).
61. TASS (2023). In Yakutia, approx. 80 km of a private railway line was built from the Elginskoye field, 16 December URL: https://tass.ru/ekonomika/16611595 (in Russian).
62. TASS (2022). EU embargo failed to spur higher Russian coal discounts, says research center, 9 November URL: https://tass.com/economy/1534309.
63. Zainullin, E (2023) Big boat - cheap coal. Kommersant 10 January, URL: https://www.kommersant.ru/doc/5759417 (in Russian).

## 4.2 HIGH GLOBAL COAL PRICES ALLOW FOR DISCOUNTS

Global coal prices hit an all-time high in 2022, allowing Russian coal producers more flexibility to subsidize transport expenses and offer discounts to attract new buyers. The initial price surge was due largely to China cutting domestic production, to issues of labour safety, to politically-motivated changes to Australian coal production, and coal export bans in Indonesia.[64] Weather changes, such as a cold winter in Asia and flooding in Australia also contributed to coal shortages. Furthermore, Western sanctions on Russian coal and surging gas prices exacerbated the shortage.[65] Figure 9 shows the sudden surge in coal prices since the second half of 2021 and a significant decline since January 2023, with the preparation for the winter heating season passing and the European energy crisis is easing.[66] See Fig. 9, which uses the price for 6,000 kcal/kg Australian Newcastle coal, widely used as a price metric.

In order to secure new contracts, Russia offered significant price discounts of up to 50–70%. By the beginning of the Ukraine war, coal prices were well above the 5-year average, and the rise in coal exports enabled coal companies to increase incomes, expand, and diversify their businesses.

## 4.3 RISING COSTS OF COAL PRODUCTION

The cost of coal production in Russia before the Ukraine war was low. For example, in 2020 and 2021, the largest Russian coal company SUEK estimated the cost of its coal production at USD 14 per ton.[72] An industry-wide estimate in 2021 was some USD 38 per ton.[73] In the first three quarters of 2022, this had risen to USD 55 per ton, mainly due to a 40% increase in material costs.[74] In rubles, the cost of coal production January–September 2022 increased by almost 50% compared to the same period in 2021.

Rail delivery costs from Kuzbass to western ports were estimated at USD 45.5–50.3 per ton and to eastern ports at USD 53.9–60.1 per ton (Table 4). Coal trans-shipment costs ranged between USD 8.5 and 42.0 per ton for western ports and USD 18.5–22.6 per ton for the eastern port Vostochny. However, the price for trans-

Figure 9. Changes to Global Coal Prices 2018–2023[67]

64. International Banker (2022) Why have coal prices surged since late 2020? 23 March, URL: https://internationalbanker.com/brokerage/why-have-coal-prices-surged-since-late-2020/; Tani, S (2022) Indonesia to end coal export ban with tighter local supply rules, 31 January, URL: https://asia.nikkei.com/Business/Markets/Commodities/Indonesia-to-end-coal-export-ban-with-tighter-local-supply-rules.
65. IEA (2022) Coal Market Update July 2022: Prices. https://www.iea.org/reports/coal-market-update-july-2022/prices.
66. Russell, C (2023) Column: Asia thermal coal prices slip as China, India buy less, 30 January, URL: https://www.reuters.com/markets/commodities/asia-thermal-coal-prices-slip-china-india-buy-less-russell-2023-01-30/.
67. Trading economics 17 March 2022. URL: https://tradingeconomics.com/commodity/coal. (2010, USD/ton) URL: https://tradingeconomics.com/commodity/coal.

shipment in southern ports has been as high as USD 60 per ton.[75] In comparison, in 2020 and 2021 SUEK paid some USD 23.0 per ton for rail transport rail, and USD 2.1 and USD 3.0 per ton, respectively, for trans-shipment from its own ports.[76]

Applying the exchange rate at the end of July 2022 to the average cost of coal production in Russia in the first three quarters of 2022, the average cost of coal production was USD 63 per ton. Thus, at least in one southern port (Taman) and in two north-western ports (Murmansk and Ust-Luga) coal exports were clearly running at a loss at the end of July.

Since July 2022, prices for Russian coal in western and in eastern ports have decreased slightly, and the discount to Australian Newcastle FOB coal has expanded (Figure 10). This decrease was compensated by the weakening of the rouble. However, if the FOB prices in Russian ports approach USD 100 per ton and this is not compensated by the exchange rate (rouble stronger than 1 USD = 85 RUB), the Russian coal industry will incur losses (Figure 11). This conclusion is also supported by other estimates.[77]

Table 4. Structure of coal (NAR 6,000 kcal/kg) export costs from Kuzbass, per 29 July 2022, USD/ton[68]

| | Southern ports (western part of Russia) | | | | | Northwestern ports | | | Eastern ports | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Novorossiysk | Tuapse | Rostov-on-Don | Temryuk | Taman | Murmansk | Ust-Luga | Vysotsk | Vostochny | VUT | Evraz NCSP | Astafyeva | Vanino CSP |
| FOB price in the port | 137.67 | 137.67 | 137.67 | 137,67 | 137.50 | 130.00 | 130.00 | 130.00 | 181.42 | 181.42 | 181.42 | 181.42 | 181.42 |
| Related expenses | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 |
| Trans-shipment costs | 14.00 | 14.00 | 8.50 | 10.00 | 42.00 | 27.50 | 35.00 | 19.00 | 22.50 | 22.15 | 18.50 | 20.50 | 22.60 |
| Railway delivery costs | 47.54 | 48.28 | 45.49 | 47.65 | 47.67 | 50.25 | 45.48 | 46.11 | 60.08 | 60.08 | 59.17 | 59.17 | 53.92 |
| Netback price, FCA Kuzbass | 74.84 | 74.1 | 82.39 | 78.73 | 46.54 | 50.96 | 48.23 | 63.60 | 97.55 | 97.90 | 102.46 | 100.46 | 103.61 |
| Netback price, FCA Kuzbass in RUB/t | 4,506 | 4,461 | 4,960 | 4,740 | 2,802 | 3,068 | 2,904 | 3,829 | 5,873 | 5,894 | 6,168 | 6,048 | 6,238 |
| Average cost of coal production in 1-3q 2022, RUB/t | RUB 3,798 (USD 63.00) | | | | | | | | | | | | |

68. *Argus* (2022). Argus Russian Coal. 1 August 2022, Issue 22-29. URL: https://www.argusmedia.com/-/media/Files/sample-reports/argus-russian-coal.ashx?la=en&hash=589FC5F1CEFBB55D2A2BC980BAD1093B7B4D9703 and Petrenko, I (2022) The results of the coal industry in Russia for January–September 2022, *Coal* No. 12. http://www.ugolinfo.ru/artpdf/RU2212007.pdf (in Russian).

# 4. PROSPECTS FOR ALTERNATIVE MARKETS FOR RUSSIAN COAL

Figure 10. Prices for Russian coal against Australian and European benchmarks, USD/t, January–September 2022[69]

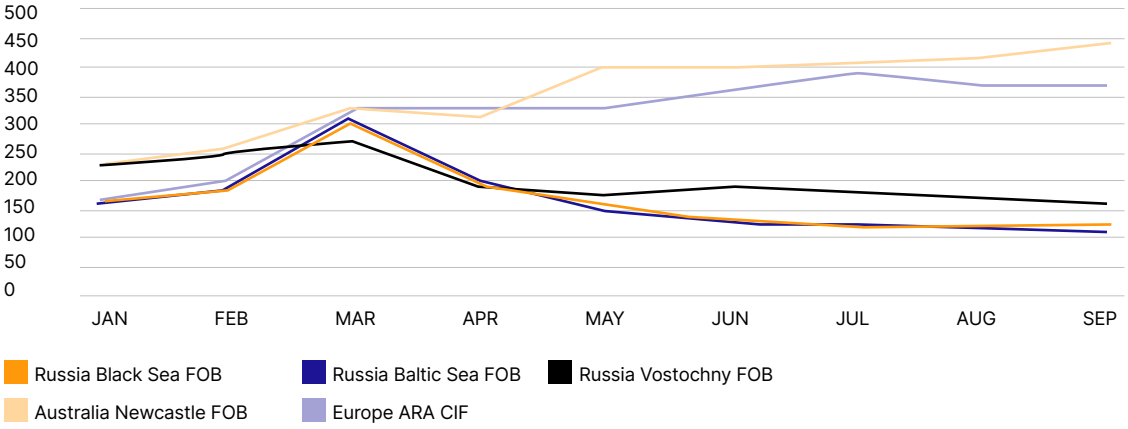
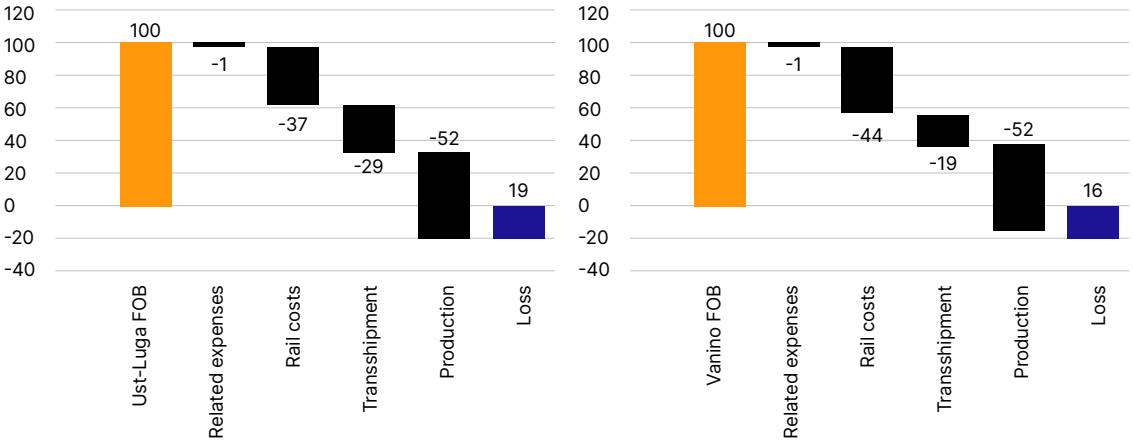



Figure 11. Estimated losses of coal exports from Kuzbass at USD 100 FOB price for 1 ton of coal (NAR 6,000 kcal/kg); exchange rate as of early 2023 (1 USD = 73 RUB)[70]




## 4.4 LIMITED INTERNATIONAL MARKETS FOR BITUMINOUS COAL

Finding alternative markets for coal is further complicated by the fact that there are various types of coal, and specific countries seek to import specific types. Most of the coal that Russia exports is high quality, such as hard coal and metallurgical coal (coking coal to produce coke). Hard coal accounted for 84.5% (180.2 MT) and metallurgical coal for 9.6% (21.8 MT) of Russia's coal exports in 2021 (EIA data). Coal of lower quality is mostly consumed domestically (Table 5).

Table 5. Production, Consumption and Net Export of Various Types of Coal in Russia, 2021[71]

| | Anthracite | Metallurgical | Bituminous | Subbituminous | Lignite |
|---|---|---|---|---|---|
| Production | 25.5 | 98.4 | 176.5 | 56.3 | 79.7 |
| Consumption | 2.9 | 76.6 | 18.9 | 55.1 | 68.5 |
| Net export | 22,6 | 21,8 | 157,6 | 1,2 | 11,2 |

69. Petrenko, I (2022) Results of the coal industry in Russia, January–September 2022, *Coal* No. 12. http://www.ugolinfo.ru/artpdf/RU2212007.pdf (in Russian).
70. Source: authors' estimates, on the basis of Argus (2022). Argus Russian Coal. 1 August 2022, Issue 22–29. URL:https://www.argusmedia.com/-/media/Files/sample-reports/argus-russian-coal.ashx?la=en&hash=589FC5F1CEFBB55D2A2B-C980BAD1093B7B4D9703; Petrenko, I (2022) Results of the coal industry in Russia for January–September 2022, *Coal* No. 12. http://www.ugolinfo.ru/artpdf/RU2212007.pdf (in Russian).
71. EIA data, https://www.eia.gov/international/data/world/coal-and-coke/coal-and-coke-production.

# 4. PROSPECTS FOR ALTERNATIVE MARKETS FOR RUSSIAN COAL

International demand for Russian coal can be divided into metallurgical coal and thermal coal. Table 6 shows what types of coal are imported by various countries (accounting for 93.5% of Russian coal exports in 2021). Russia's main coal export is bituminous coal; and 38% of its markets were in the countries that later imposed sanctions. On the other hand, demand for sub-bituminous coal and lignite increased in China and India. Demand for sub-bituminous, metallurgical, and lignite coal might increase also in other countries, such as Vietnam, Taiwan, Malaysia, Egypt, Morocco and even the UAE.[72] However, this is the same type of coal that Russia consumes domestically, and may not address the challenges that Russia is faces regarding reduced demand for its main export, *bituminous coal*. The sanctions against steel and iron imports, and thus reduced production levels that cut domestic demand for metallurgical coal, seem apparent in Russian domestic consumption: in January–September 2022, imports of metallurgical coal increased by 27% while exports of anthracite and thermal coal decreased.[73]

## 4.5 LIMITED DOMESTIC DEMAND FOR COAL AND COMPETITION WITH GAS

As the rapid growth of the Russian coal industry since 2000 has relied on expansion of exports, the current domestic coal market is unable to compensate for the revenues previously generated by exports to the EU. While coal exports have increased six-fold, domestic consumption of coal has not changed dramatically since 2000.[75] Domestic demand for energy coal is expected to decline rather than increase, and, despite sanctions, the Kuzbass coal industry did not supply more coal to the domestic Russian market in 2022. According to the government of Kuzbass, the growth of shipments to domestic consumers has been affected by coal imports from Kazakhstan and by the longer-term trend of replacing coal with natural gas in the Russian energy sector.[76] In the medium term, the scale of modernization

Table 6. Total Coal Imports for Various Types of Coal, Key Countries (2021)[74]

| | Anthracite | Metallurgical | Bituminous | Sub-bituminous | Lignite |
|---|---|---|---|---|---|
| China | 9.2 | 54.7 | 82.4 | 58.3 | 119.1 |
| Japan | 6.1 | 42.9 | 125.6 | 7.9 | - |
| India | 2.0 | 60.3 | 57.8 | 70.3 | 0.8 |
| EU | 4.4 | 39.4 | 59.7 | 30.8 | 1.3 |
| S Korea | 6.5 | 35.9 | 81.2 | 2.0 | - |
| Taiwan | 0.3 | 7.1 | 49.0 | 11.0 | - |
| Turkey | 0.8 | 5.3 | 30.4 | - | - |
| Ukraine | 3.4 | 11.5 | 3.7 | 0.9 | - |
| Morocco | 0.2 | 0.4 | 10.0 | - | - |
| Brazil | - | 10.6 | 11.3 | 0.1 | - |
| Vietnam | 0.9 | 4.7 | 15.7 | 14.2 | - |
| Malaysia | 0.1 | 2.3 | 0.2 | 32.5 | - |
| **TOTAL** | **34.2** | **275.1** | **527.0** | **228.0** | **121.2** |
| Demand excl. sanctions & Ukraine | 20.7 | 181.4 | 353.9 | 188.4 | 119.9 |
| Russian net exports | 22.6 | 21.8 | 157.6 | 1.2 | 11.2 |

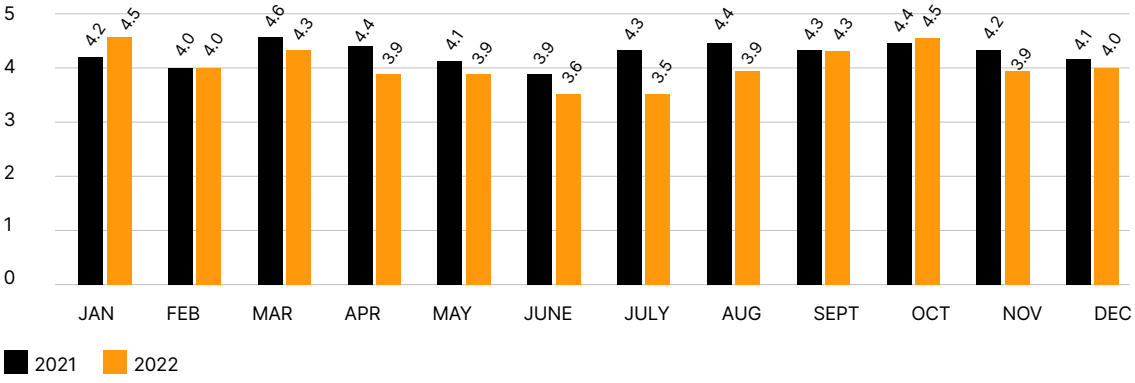
72. Tikhonov, S (2021) What future awaits for Russian coal, Rossiyskaya Gazeta 7 January, https://rg.ru/2021/01/07/kakoe-budush-chee-ozhidaet-rossijskij-ugol.html (In Russian).
73. Zainullin, E (2023) Cheap coal – big ship. Kommersant 10 January, URL: https://www.kommersant.ru/doc/5759417 (in Russian).
74. EIA data, https://www.eia.gov/international/data/world/coal-and-coke/coal-and-coke-production.
75. Korppoo A. et al. (2021). The Russian coal sector in a low-carbon world: Prospects for a Coal Transition? // Insights Report by Climate Strategies. URL: https://climatestrategies.org/wp-content/uploads/2021/10/Russian-coal-sector-prospects-for-coal-transition_Nov21.pdf.
76. TASS (2022). Kuzbass authorities report a slight increase in coal sales on the Russian market, 13 July URL: https://tass.ru/ekonomika/15199259?utm_source=google.com&utm_medium=organic&utm_campaign=google.com&utm_referrer=google.com (in Russian).

and de-commissioning of obsolete coal-fired power plants is a central factor. Domestic consumption of coking coal was expected to decrease slightly as well, due to a reduction in the share of oxygen furnaces in smelting, as well as increased efficiency in industrial processes.[77] Railroad transport data show that domestic coal shipments from Kuzbass in most months of 2022 were lower than in the corresponding months of 2021 (Figure 12). The slight increase in consumption of coal for energy may be due to the decrease in hydropower generation caused by lower water levels.[78]

The sanctions on the import of crude oil and oil refinery products also impact the coal sector through competition between fossil fuels. Residual heavy-fuel oil (mazut), which is generated as a side product of petrol, diesel and kerosene production, is a major export product for Russia. A sharp drop in export demand for mazut in 2022 led to overproduction, placing a burden on storage capacities. In April 2022, the largest private Russian oil company (LUKOIL) suggested that mazut be used for domestic power and heat generation, as storage facilities were at maximum capacity. However, mazut was largely exported from May–July 2022, primarily to the Middle East and Northern Africa, China, and Malaysia. Exports are likely to decrease in 2023: the EU has embargoed the import of petroleum products starting in March 2023, which will add to the pressure to use mazut for domestic energy purposes. In turn, this will reduce domestic consumption of coal, further burdening the coal sector and the Kuzbass economy.

The coal sector in Kuzbass also faces competition with gas, which has become increasingly popular, particularly in the Far East, where gas prices were outcompeting coal in the years preceding the Ukraine war. Moreover, the sudden drop in exports of natural gas to the EU in 2022 created a surplus. This presented a challenge, as there was no infrastructure for rapidly increasing gas exports to other countries or accelerating the production of liquified natural gas (LNG). Thus, Gazprom and other producers are probably attempting to expand domestic gas consumption – which would compete with coal supplies. Currently there are 68 agreements between Gazprom and regional governments in Russia for increased gas supplies from 2021–2025, to a value of capital investments of over $8 billion. By 2030, Gazprom plans to supply 100% of Russia's energy needs, although this appears unlikely under the present circumstances.[80] Also the significantly lower prices of domestic gas in comparison to export prices adds to this uncertainty.[81] The gasification programme in Kuzbass aims at switching 88 boiler houses and industries and over 15,000 households from coal to natural gas by 2025,[82] which will lead to significant competition between natural gas and coal in the region, even though the importance of such competition is hard to estimate.

Figure 12. Railroad Domestic Transportation of Coal from Kuzbass MT[79]




77. Centre for Socio-Economic Research (2020) Prospects for the development of the coal industry in Russia URL: https://www.csr.ru/upload/iblock/fd6/fd69a69529035a5127eb498dfcc7d565.pdf (In Russian).
78. Ministry of Energy of the Russian Federation (2022). Nikolay Shulginov: 'We do not foresee risks of fuel supply disturbance to thermal power plants of Siberia in the coming winter'. URL: https://minenergo.gov.ru/node/23515 (in Russian).
79. Ministry of Coal Industry of Kuzbass (2022). Coal industry. Indicators. URL: https://mupk42.ru/ru/industry/pokazateli/2022-god.php (in Russian).
80. Gazprom. Russian Gasification Programme of PJSC Gazprom 2021–2025. URL: https://www.gazprommap.ru/program/ (in Russian).
81. Kalashnikov, V (2022) Sanctions will help the North-West of Russia, Kommersant 6 May, URL: https://www.kommersant.ru/doc/5340778 (In Russian)
82. Gazprom. Kemerovo region – Kuzbass. URL: https://www.gazprommap.ru/kemerovskaya/ (in Russian).

## 4.6 LOW-CARBON TREND AND PROSPECTS FOR COAL DEMAND IN ALTERNATIVE MARKETS

We have considered the possible impacts on exports for several key countries, based on their climate and energy policies. Although many countries have committed to carbon neutrality, few have committed to phase out coal entirely (see Table 6). Shifting environmental policies, competitive renewable energy production and storage, and international politics all affect Russian coal exports. While some countries have increased demand for Russian coal imports due to rapidly rising energy demand, it is uncertain whether this will continue, given climate commitments and energy alternatives.

Another key factor is coal divestment. Since 2013, China, Japan and South Korea have accounted for over 95% of foreign funding for coal. However, in April 2021, Korea and Japan committed to ending their overseas investments in coal,[83] and China followed suit in September.[84] This has a significant impact on many developing countries that have been hoping to expand their coal fleet (see Table 7). The global pipeline of proposed coal-power plants has declined by 76% already between 2015 and 2021.[85] However, there remains 2,100 GW of coal-fired power generation capacity globally, which means continued demand for coal in the near future.[86]

**China** accounts for about half of all global coal consumption, including 52% of the world's coal-fired generation capacity and 53% of coal-fired capacity under construction (as of July 2022). It has commissioned a whopping 311 GW of new coal-fired capacity since 2015,[88] during which time it has retired 56 GW of old coal-fired capacity.[89] Chinese power demand grew by 30.1% from 2015 to 2019,[90] prompting investment in the coal sector. Overall reliance on coal has decreased, however, as China's share of coal-fired generation fell from 78.3% in 2010

Table 7. Climate Goals and Power Sector Trends in Potential Future Markets for Russian Coal,[87] 2019

| | Carbon neutrality target | Coal phase out commitment | GHG emission trend, 2019 % of 2015 | RES % of power generation | Low-carbon % of power generation | Coal % power generation | Coal demand, 2019 % of 2015 | Power demand, 2019 % of 2015 | $CO_2$- intensity of power sector, 2019 % of 2015 |
|---|---|---|---|---|---|---|---|---|---|
| **China** | 2060 | Peak 2025 | 107.5 | 22.4 | 26.3 | 68.6 | 103.6 | 129.1 | 94.9 |
| **India** | 2070 | no | 110.8 | 20.0 | 22.9 | 72.7 | 110.9 | 120.9 | 92.9 |
| **S Korea** | 2050 | 2050 | 102.1 | 4.6 | 27.3 | 37.3 | 99.0 | 105.2 | 97.5 |
| **Taiwan** | 2050 | no | 99.0 | 4.7 | 15.6 | 50.4 | 101.2 | 106.8 | 95.9 |
| **Turkey** | 2053 | no | 113.1 | 41.6 | 41.6 | 35.5 | 121.4 | 118.7 | 96.0 |
| **Morocco** | No | no | 114.3 | 18.3 | 18.3 | 68.6 | 150.0 | 110.7 | 99.2 |
| **Brazil** | 2050 | no | 96.5 | 82.2 | 84.7 | 3.4 | 87.6 | 104.4 | 65.4 |
| **Vietnam** | 2050 | 2040s | 134.9 | 31.3 | 31.3 | 49.9 | 173.4 | 147.6 | 149.0 |

83. Liu, R, Yang, T (2022) Russia and India talk through coking coal supply continuation, http://www.sxcoal.com/news/4651149/info/en#:~:text=On%20June%202021%2C%20the%20two%20sides%20prepared%20memorandum,coal%20per%20year%2C%20and%20imports%20supplied%2085%25%20demand.
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85. Littlecott, C; Roberts, L; Şenlen, Ö; Burton, J; Joshi, M; Shearer, C and Ewen, M (2021) No new coal by 2021, the collapse of the global coal pipeline, E3g September 2021, https://9tj4025ol53byww26jdkao0x-wpengine.netdna-ssl.com/wp-content/uploads/No-New-Coal-by-2021-the-collapse-of-the-global-pipeline.pdf.
86. Global Energy Monitor et al. (2022) Boom and Bust Coal 2022, https://globalenergymonitor.org/wp-content/uploads/2022/04/BoomAndBustCoalPlants_2022_English.pdf.
87. Sources: https://en.wikipedia.org/wiki/Carbon_neutrality; CAIT data, Taiwan: https://eng.stat.gov.tw/public/data/dgbas03/bs7/greengnp_eng/Air%20Pollution_Emission%20Account.pdf; IEA data; https://www.reuters.com/world/china/chinas-xi-says-china-will-phase-down-coal-consumption-over-2026-2030-2021-04-22/; Lee, E (2021) South Korea approves coal phase-out by 2050, Argus Media, 27 October, URL: https://www.argusmedia.com/en/news/2267757-south-korea-approves-coal-phaseout-by-2050; Anh, P (2021) Vietnam pledges to phase out coal power, VN Express, 4 November, URL: https://e.vnexpress.net/news/news/vietnam-pledges-to-phase-out-coal-power-4381543.html.
88. Global Coal Plant Tracker (2022) New Coal-fired Power Capacity by Country, July 2022, https://docs.google.com/spreadsheets/d/1W3pt5FhqitHwbVWvvgfRr0S6QfqfOuea9pt3-MIxp5M/edit#gid=1682876416.
89. Global Coal Plant Tracker (2022) Retired Coal-fired Power Capacity by Country, July 2022, URL: https://docs.google.com/spreadsheets/d/1xUOYq8tUZi2dcHLRZ3W1viZHyGgUlbrMxG5xIXyTOug/edit#gid=81921775.
90. https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=CHINA&fuel=Electricity%20and%20heat&indicator=TotElecCons

to 68.6% in 2019. Simultaneously, the share of renewables and nuclear energy increased, from 17.1% to 26.3%.[91] However, China has halved its renewable energy targets for the 2021–2025 5-Year Plan.[92] Moreover, the government aimed to increase domestic coal production by 300 MT in 2022.[93] This target was exceeded by increasing production by 405 MT.[94] Energy security concerns could explain China's decision to import 100 MT coal from Russia in the 'coming years',[95] or while the additional domestic coal production capacity is introduced. Thus, the growth in coal imports from Russia to China is likely decline mid-term; in 2022 imports declined by 9.2%.[96]

**India** has commissioned 75 GW of new coal-fired power generation capacity since 2015,[97] and has retired 12 GW during the same period.[98] Power demand grew by 20.9% during 2015–2019.[99] As a result, India has been constructing 31.3 GW of new coal capacity, and has announced a further 25.7 GW as of July 2022.[100] India has not committed to phasing out coal. At COP26 in 2021, India proposed the wording coal '*phase down*' instead of '*phase out*', given the important role of coal in domestic social development;[101] at COP27 in 2022, it called for 'phase down' of all fossil fuels.[102]

India aims to install 500 GW of renewable capacity by 2030 but the 175 GW target for 2022 was postponed.[103] India has agreed to increase its annual demand for Russian coal to 40 MT; however, this applies to coking coal, not thermal coal.[104] In August 2022, Russia became the third-largest supplier of thermal coal to India. Indian banks have recently agreed to trade in yuan, rubles and other currencies, and have started avoiding trade in US dollars with Russian counterparts, to counter the risks of violating Western sanctions.[105] However, the EU and the USA have pressured India to reduce its Russian coal imports; and Tata Steel, India's main importer of Russian coal, announced it would stop buying Russian coal in April 2022.[106]

**South Korea** has a coal fleet of 38 GW.[107] It has commissioned 14.2 GW of new coal-fired capacity since 2015,[108] and has retired 3.3

91. https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=CHINA&fuel=Electricity%20and%20heat&indicator=ETISharesInPowerGen.
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98. Global Coal Plant Tracker (2022) Retired Coal-fired Power Capacity by Country, July 2022, URL: https://docs.google.com/spreadsheets/d/1xUOYq8tUZi2dcHLRZ3W1viZHyGgUlbrMxG5xIXyTOug/edit#gid=81921775.
99. https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=INDIA&fuel=Electricity%20and%20heat&indicator=TotElecCons.
100. Global Coal Plant Tracker (2022) Coal-fired Power Capacity by Country, July 2022, URL: https://docs.google.com/spreadsheets/d/1W-gobEQugqTR_PP0iczJCrdaR-vYkJ0DzztSsCJXuKw/edit#gid=822738567.
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106. WhileTata Steel still imported some 75,000 tons of coal from Russia in May 2022, no further such transactions have been discussed in the press since. *Economic Times* (2022). Tata Steel buys coal from Russia weeks after vowing to cut ties, URL: https://economictimes.indiatimes.com/news/economy/foreign-trade/tata-steel-buys-coal-from-russia-weeks-after-vowing-to-cut-ties/articleshow/92342218.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst.
107. Global Energy Monitor et al. (2022) Boom and Bust Coal 2022, https://globalenergymonitor.org/wp-content/uploads/2022/04/BoomAndBustCoalPlants_2022_English.pdf.
108. Global Coal Plant Tracker (2022), New Coal-fired Power Capacity by Country , July 2022, https://docs.google.com/spreadsheets/d/1W3pt5FhqitHwbVWvvgfRr0S6QfqfOuea9pt3-Mlxp5M/edit#gid=1682876416.

GW during the same period.[109] Power demand grew by 6% from 2015 to 2020.[110] South Korea is currently building 4.1 GW of new coal-fired capacity;[111] according to the IEA,[112] the country's coal-fired capacity is expected to peak in 2022 at 42 GW, and then slowly decline. The Korean government has ended most overseas finance on coal and many domestic financial institutions withdrew from financing new coal capacity.[113] Because of its support to the G7 group, which issued sanctions against Russia, Korea has been considering the possibility that Russia may cut off coal supplies,[114] however, in practice it increased its Russian imports during the second half of 2022.

**Taiwan** has 19.2 GW of operating coal-fired power capacity.[115] It commissioned over 4 GW of new coal-fired power capacity since 2015[116] and has retired 0.6 GW during this period.[117] Power demand grew by 14.2% between 2010 and 2020.[118] Doubts have been expressed on whether Taiwan is likely to achieve its renewable energy goal of 25% of RES by 2025;[119] however, a more recent target aims at increasing wind energy capacity annually by 1.5 GW during 2026–2035.[120] Taipower, which operates some 70% of coal-fired power capacity in Taiwan,[121] has announced that it will not renew its Russian coal contracts after August 2022.[122]

**Turkey's** energy policy aims to reduce import dependence for economic and energy security reasons.[123] However, Turkey still relies on imports for 58% of its coal demand[124] and power demand has increased by one third during 2010-2020.[125] Turkey has commissioned 5.3 GW of new coal-fired capacity since 2015 and de-commissioned 0.3 GW.[126] Its most recent Hunutlu coal power plant, commissioned in 2022 and built with the support of Chinese investments, relies on imports of Russian coal.[127]

Turkey plans to build 7.5 GW of new coal-fired power-generation capacity. However, this will be met with domestic coal production, limiting the option of importing more Russian coal.[128] There has been public opposition to the use of coal[129] and investments planned for coal have

109. Global Coal Plant Tracker (2022) Retired Coal-fired Power Capacity by Country, July 2022, URL: https://docs.google.com/spreadsheets/d/1xUOYq8tUZi2dcHLRZ3W1viZHyGgUlbrMxG5xIXyTOug/edit#gid=81921775.
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been redirected to renewable energy.[130] The Chinese announcement to stop investing in coal internationally is likely to lead to a further reduction in Turkey's investment plans.[131] Simultaneously, the government has increased its renewables target to 38.8% of power generation by 2023 under the 11th Development Plan.[132] Turkey's ambitions of reducing import dependence and supporting domestic coal production indicate that Russia's export prospects could be limited to the mid-term.

**Morocco** has no domestic coal production. As its energy sector relies heavily on coal power, this has resulted in high import dependency. Power demand has increased by over 30% in the last decade, increasing dependency on cheaper Russian coal.[133] However, Morocco's energy strategy aims to shift to a 52% share of renewable energy by 2030, and 70% by 2040, due to the declining costs of renewable energy and energy storage.[134] Further, there is even some political will to exceed the 2030 renewable energy target.[135] Morocco's solar potential is significant, and major solar energy projects have already been implemented, allowing Morocco to claim regional leadership in low-carbon development.[136] On the other hand, much of Morocco's coal-fired capacity is new or recently updated[137] and is unlikely to be decommissioned soon, thus ensuring some demand for coal imports in the future.

**Brazil** generates a small proportion of its energy from coal-fired plants and produces about 25% of its coal needs domestically. Brazil's 'just transition law' obliges the government to start buying 80% of local coal-generated energy at a set price while simultaneously it requires the country to meet its 2050 carbon-neutrality pledge.[138] The country has reduced its coal imports from Russia since 2022; it remains to be seen whether the new Lula administration will take a different approach to coal.

**Vietnam's** power demand grew by 47.6% between 2015 and 2019. Domestic supplies meet half of its coal demand, but imports are expected to grow during 2025–35 due to increasing demand. According to the national development plan for the coal sector, coal demand is expected to peak around 2030.[139] The country has commissioned 12.6 GW of new coal-fired capacity since 2015,[140] which is in contradiction to its COP26 commitment to phase out coal and to halve the number of new coal-fired plant constructions.[141] It is unclear how the required new capacity will be financed now that Japan, Korea and China have divested themselves of their coal investments;[142] however, Vietnam's recently launched Just Energy Transition Partnership will mobilize USD 15.5 bln to finance a green transition.[143]

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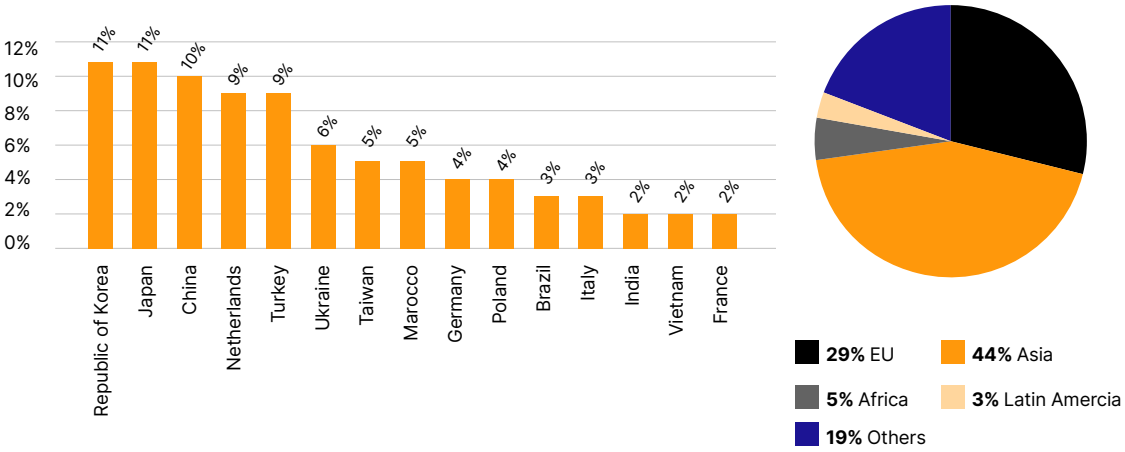
# 5. IMPACTS OF COAL SANCTIONS ON THE KUZBASS COAL MINING REGION

## 5.1 CHANGES TO COAL EXPORTS FROM KUZBASS, 2021–2022

In 2021, Kuzbass exported hard coal to some 60 countries (Figure 13), with 44% of its hard-coal exports going to Asia, 29% to the EU, and a further 9% to Turkey and 6% to Ukraine.[144] Since the Ukraine war, however, coal exports from the region have declined: in 2022, 14% less coal was exported than in 2021.[145] The EU and UK coal embargos have forced Kuzbass to look for buyers for 36% of its hard-coal exports. If Japan implements sanctions fully, demand for hard-coal exports will decrease by 50%.

Even though 2018 saw a record high for investments in coal, the Ministry of Coal Industry in Kemerovo region estimates[147] that total capital investments may decline by 10% in 2022 (approx. $500 million per year) as a result of sanctions, while divestment, particularly by foreign shareholders, investors, banks and other financial institutions, continues and increases. However, Kuzbass coal companies have continued investing in facilities that are already under construction[148] and 2022 was statistically another record year for coal sector investment in Kuzbass with an increase of 23.5% from previous year.[149] Rather than purely commercial decisions , this is likely linked to spending profits to avoid future windfall taxes planned by the government (even though fossil fuel sectors are officially not to be included, but for instance Gazprom had to pay such a tax already in 2022)[150], in particular, as the state is expecting contributions already in 2023.[151] The Kuzbass regional administration intends to support the coal industry to cope with the consequences of sanctions. It has proposed that the federal level should abolish the recent increase in the mineral extraction tax on coking coal, increasing the volume of coal transport by rail from Kuzbass by at least 30% – up to 68 million tons – by 2024, and providing discounts for rail transport of coal from Kuzbass to the ports of the Azov, Black and Baltic seas, to support more shipping to Asia.[152]

Figure 13. Top-15 destinations of Kuzbass Coal exports in 2021 by weight, % of total exports from Kuzbass[146]




144. Russian customs statistics: http://stat.customs.ru/.
145. The Coal Hub (2022), Coal production in Kuzbass down 8% in 2022, https://thecoalhub.com/coal-production-in-kuzbass-down-8-in-2022.html
146. Calculated by the authors on the basis of the Federal Customs Service (2022). Export and import of the Russian Federation by goods. URL: https://customs.gov.ru/folder/502 (in Russian).
147. TASS 13 June 2022 The Kuzbass authorities expect a 10% decrease in investments in the coal industry by the end of the year. URL: https://tass.ru/ekonomika/14893761 (in Russian).
148. Potapova Y. (2022). How the coal industry of Kuzbass overcomes prohibitions and restrictions URL: https://rg.ru/2022/09/29/reg-sibfo/kak-ugolnaia-otrasl-kuzbassa-preodolevaet-zaprety-i-ogranicheniia.html (in Russian).
149. Kemerovostat (2023) Investments in fixed assets by type of economic activity in 2022 (in Russian) https://kemerovostat.gks.ru/folder/38705
150. Trevelyan, M, Cordell, J and Marrow, A (2023) Putin tells Russia's billionaires to put patriotism before profit, Reuters 16 March, https://www.reuters.com/world/europe/putin-urges-russias-billionaires-invest-face-sanctions-war-2023-03-16/.
151. Financial Post (2023) Russia's corporate windfall tax to target around 5% of excess profits, 16 March, https://financialpost.com/pmn/business-pmn/russias-corporate-windfall-tax-to-target-around-5-of-excess-profits
152. Maritime News of Russia (2022). Kuzbass will offer the State Council of the Russian Federation an anti-sanctions package of measures to support coal miners. URL: http://www.morvesti.ru/news/1679/97926/ (in Russian).

# 5. IMPACTS OF COAL SANCTIONS ON THE KUZBASS COAL MINING REGION

Despite efforts to support the socially significant coal industry and reduce the impact of sanctions, the regional government is clearly reluctant to focus solely on a single economic sector: it is trying to diversify the economy and reduce its dependence on the coal sector. Support measures have been enacted so that new and varied small and medium-sized enterprises (SMEs) could take over the contributions of the coal and metallurgy sectors in the Kuzbass budget.[153] In early November 2022, the Russian government approved the creation of a special economic zone (SEZ), 'Kuzbass', with industrial production in the Kemerovo region. This zone is to produce a range of products, in particular mineral fertilizers (ammonia, granulated urea, liquid carbon dioxide), lime, medical furnishings and food.[39]

Figure 14. Total Coal Production in Kuzbass in 2022 compared to 2021, MT[154]

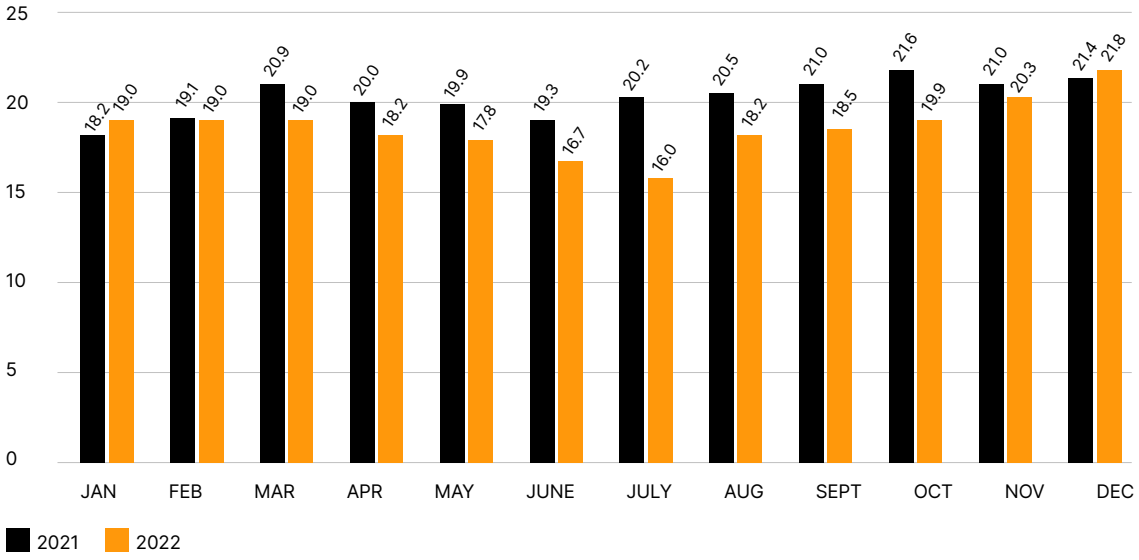
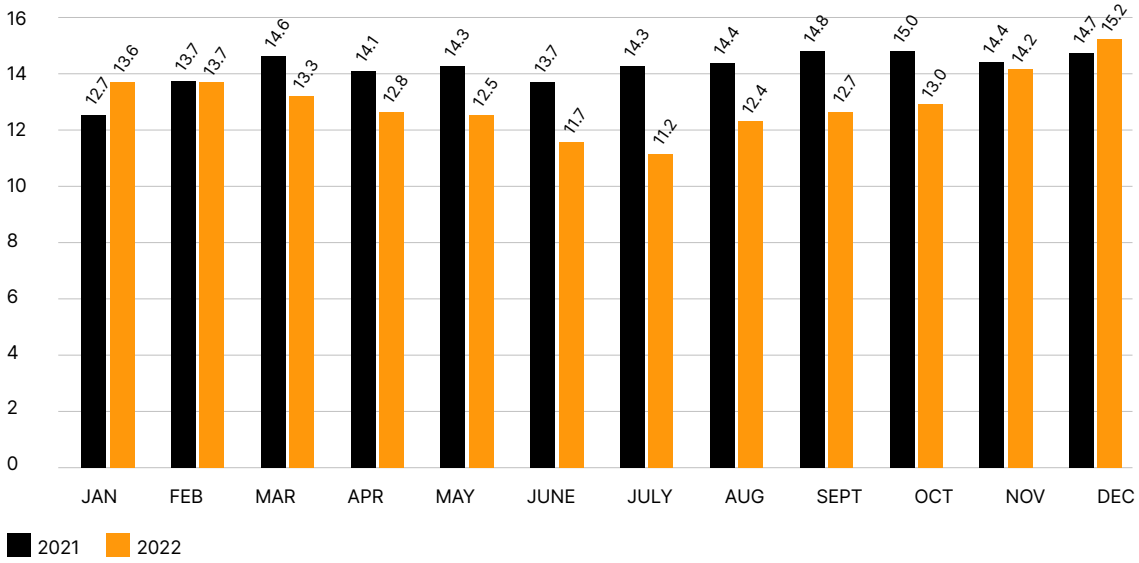
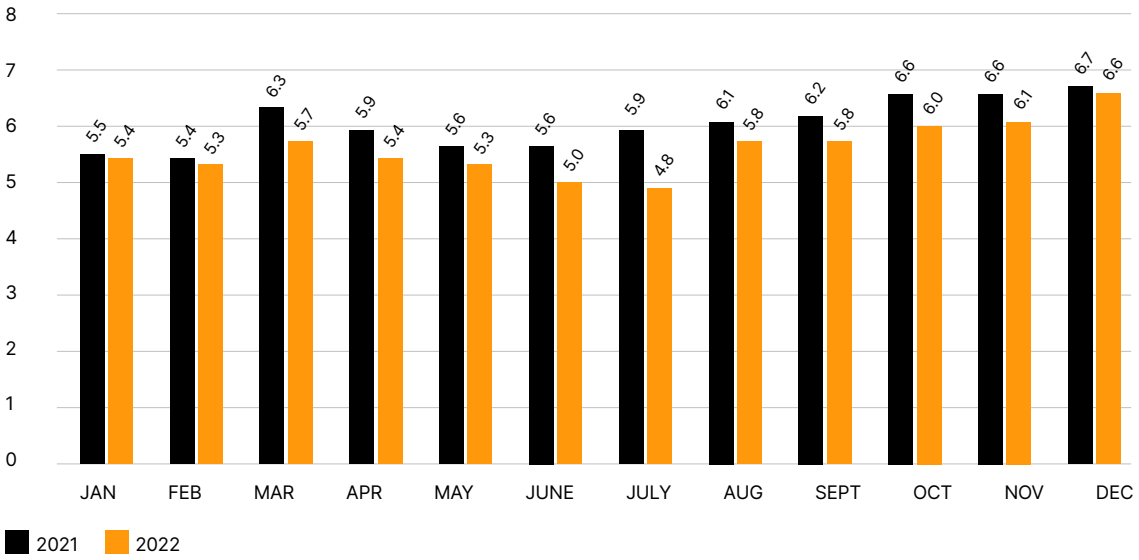



Figure 15. Energy Coal Production in Kuzbass in 2022 compared to 2021, in MT[155]




153. NGS42 (2022). Not only coal: how Kuzbass will earn money until 2030. URL: https://ngs42.ru/text/gorod/2022/09/12/71640317/ (in Russian).
154. Ministry of Coal Industry of Kuzbass (2022). Coal industry. Indicators. URL: https://mupk42.ru/ru/industry/pokazateli/2022-god.php (in Russian).
155. Ibid.

Figure 16. Coking Coal production in Kuzbass in 2022 compared to 2021, in MT[156]




In most months of 2022, coal-production volumes in Kuzbass were lower than in the corresponding months of 2021 (Figure 14) for the production of energy as well as metallurgical coal (Figures 15 and 16). Due to the EU 2022 coal embargo, some coal mining companies in Kuzbass have already had to decrease production volumes, but the impacts have been mixed. Several open pits have temporarily suspended coal production;[157] however, as of September 2022, no coal mining company has yet announced layoffs.[158] However, the processing plant LLC 'GOF Krasnogorskaya' in Prokopyevsk will suspend operations for an unspecified period – due to problems with product supply, sanctions, as well as debts to employees – making 200 employees redundant.[159] On the other hand, at the end of 2022 the Ministry of Coal Industry of Kuzbass projected that 10 new coal-sector enterprises would be established in the region during 2023–2025, including coal mines and processing plants, generating up to 3,000 new jobs.[160]

## 5.2 TRANSPORT AND LOGISTICAL CHALLENGES FOR KUZBASS COAL PRODUCERS

As Kuzbass shifts its exports focus from the West to the East, it is experiencing transport capacity challenges. The main routes for coal exports from Kuzbass in the recent decades included railways and marine transportation to Western Europe (via Murmansk port), Southern Europe (via Novorossiysk), China and Central Asia, and the Russian Far East (via BAM and Transsib railways, marine ports of Nakhodka, and others).

However, inadequate transport capacity to the east limits Kuzbass' ability to redirect its coal exports.[161] Kuzbass has been exporting 53 million tons of coal annually by rail to the eastern direction for the last five years and has faced significant struggle in increasing capacity, despite presidential orders to achieve 68 million tons of capacity by 2024. The Russian Railways (RZD) cites the lack of workforce, unreliable contractors, and lack of funding as the key issues. This will be further delayed by military conscription, as railway contractors may lose

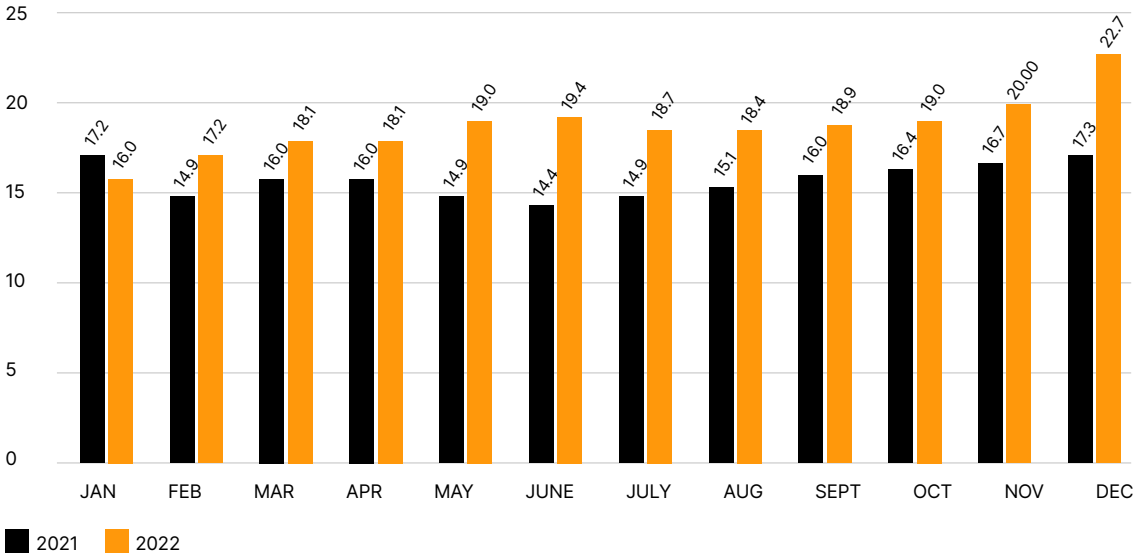
156. Ibid.
157. TASS 17 August 2022, The Kuzbass authorities announce the absence of risks of a mass reduction of miners against the back-drop of sanctions. URL: https://tass.ru/ekonomika/15492651 (in Russian).
158. Potapova Y. (2022). How the coal industry of Kuzbass overcomes prohibitions and restrictions. URL: https://rg.ru/2022/09/29/reg-sibfo/kak-ugolnaia-otrasl-kuzbassa-preodolevaet-zaprety-i-ogranicheniia.html (in Russian).
159. NGS42 (2022). Kuzbass processing plant closes due to sanctions and problems with coal shipment. URL: https://ngs42.ru/text/job/2022/09/07/71635445/ (in Russian).
160. TASS 26 December 2022, Russian Railways guarantee transportation from Kuzbass to the East in 2023 of at least 53.1 million tons of coal. URL: https://tass.ru/ekonomika/16690483 (in Russian).
161. Maritime News of Russia (2022). Kuzbass will offer the State Council of the Russian Federation an anti-sanctions package of measures to support coal miners. URL: http://www.morvesti.ru/news/1679/97926/ (in Russian).

more than 60% of their personnel in Kuzbass, in particular those with vital professions such as machine operators, construction equipment drivers, electricians and bridge workers, due to military mobilization.[162] Over 940 mobilization orders have already been delivered to contractor employees, leading to the conscription of 330 people, while many simply avoid coming to work in order to escape conscription.[163]

As a result, coal from Kuzbass has to be sent by rail to the western ports of the Azov-Black Sea and Baltic basins for shipments eastwards, but the complex logistics have led to reduced profitability.[164] One company that has been sending its coal from Kuzbass eastwards through the western ports is Russia's largest coal producer SUEK, which significantly increased its coal supplies to India in 2022. sending coal not only through Vanino port in the Far East, but also through Murmansk (Barents Sea) and Taman (Black Sea) ports. Russian coal exporters are also using the Ust-Luga port on the Baltic Sea for deliveries to India.[165] According to SUEK CEO, Maxim Basov, logistics costs comprise 50–75% of the final price for Russian coal.[166] Of the 78 million tons of coal delivered to the markets of the Asia-Pacific region in January-July 2022, 13 million tons were sent through western ports.[167] There are signs of a decline in coal exports from Kuzbass, including increasing coal stocks (see Figure 17), full warehouses which cause reduction in production[168] and high coal reserves at power plants.[169]

Capacity for railroad transportation for Kuzbass coal in the west (Figure 18) have declined significantly since the start of the war. Rail transportation of Kuzbass coal to the east recovered in July-August 2022 (Figure 19). However, despite the EU's embargo on the Russian coal imports, by November 2022, the volumes of Kuzbass coal railroad transportation in the western direction has partially recovered, which may be explained by transportation of Kuzbass coal to the east via Russia's western ports.

Figure 17. Coal Stocks in Kuzbass in 2022 compared to 2021, MT[170]




162. RZD-Partner (2021). Eastern polygon: late again. URL: https://www.rzd-partner.ru/zhd-transport/comments/vostochnyy-poligon-snova-opozdali/ (in Russian).
163. Skorlygina N. (2022). Russian Railways consolidates contracts. URL: https://www.kommersant.ru/doc/5593471 (in Russian).
164. Maritime News of Russia (2022). Kuzbass will offer the State Council of the Russian Federation an anti-sanctions package of measures to support coal miners. URL: http://www.morvesti.ru/news/1679/97926/ (in Russian).
165. Argus Russian Coal, issue 22–29, 1 August 2022. URL: https://www.argusmedia.com/-/media/Files/sample-reports/argus-russian-coal.ashx?la=en&hash=589FC5F1CEFBB55D2A2BC980BAD1093B7B4D9703.
166. Sintsova N. (2022). Coal miners encounter logistics problems, RBC 18 October. URL: https://www.rbc.ru/newspaper/2022/10/18/634936a39a79474c12bb7d89 (in Russian).
167. Ibid.
168. TASS 8 September 2022, In Kuzbass, implementation of large coal-mining investment projects was temporarily suspended, https://tass.ru/ekonomika/15690447 (in Russian).
169. Bank of Russia (2022). Regional economy: commentaries of the Bank of Russia main branches. July 2022. URL: http://www.cbr.ru/Collection/Collection/File/42167/report_14072022.pdf (in Russian).
170. The Ministry of Coal Industry of Kuzbass (2022). Coal industry. Indicators. URL: https://mupk42.ru/ru/industry/pokazateli/2022-god.php (in Russian).

# 5. IMPACTS OF COAL SANCTIONS ON THE KUZBASS COAL MINING REGION

Figure 18. Railroad Transport in the West, MT[171]

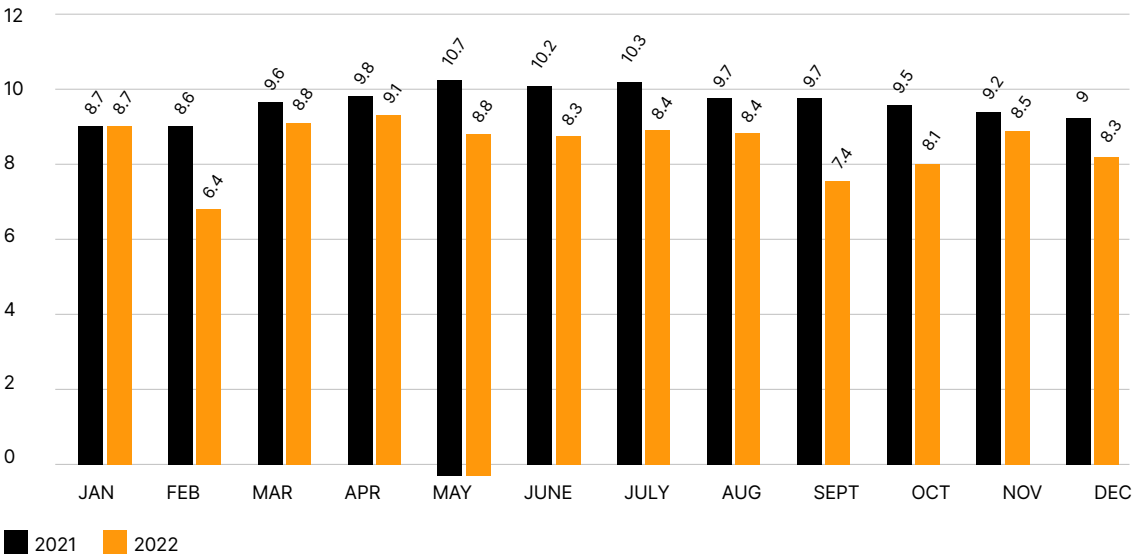
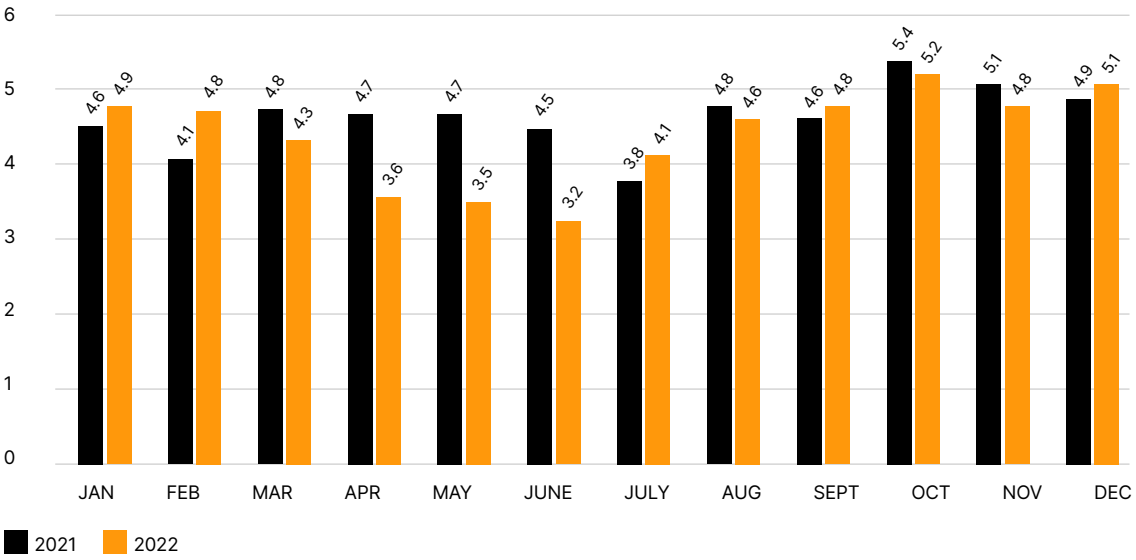



Figure 19. Railroad transportation in the East, MT[172]




## 5.3 CHANGES TO THE KUZBASS LABOUR MARKET RESULTING FROM DECLINING COAL

In 2020, the coal industry employed 106,000 persons in Kuzbass, or 9% of the labour force.[173] The decline of the coal sector as an employer is likely to accelerate due to the war in Ukraine. Several social and economic factors are involved in Kemerovo region. First, the decline in coal exports from Kuzbass is likely to lead to faster job cuts than those planned by the government. Second, many coal-sector jobs have been converted to seasonal job as the law forbids employers from laying off workers or reducing hours.[174] This reduction in full-time coal work is not visible in labour statistics, as the employees

171. Ibid.
172. Ibid.
173. Territorial body of the Federal State Statistics Service for the Kemerovo region (2020) To the day of the miner! The labour market and employment of the population. Federal State Statistics Service, 26 August.URL: https://kemerovostat.gks.ru/folder/95026.
174. Meduza (2022). Either try to survive, or leave with money and go nowhere. URL: https://meduza.io/feature/2022/08/13/libo-pytatsya-vyzhit-libo-uyti-s-dengami-no-v-nikuda (in Russian).

retain their jobs at minimum pay and continue receiving social benefits,[175] similarly to the case of the 1990s reforms.[176] Third, a significant share of the Kuzbass coal-sector employees could be conscripted. By the beginning of October 2022, at least five contingents (about 2500 persons) from Kuzbass had been sent to the war. Conscripted Kuzbass workers are paid a lump sum of 200,000 rubles (€3,400).[177] For many families, they are the main breadwinners, which creates new social and economic problems,[178] in particular, as promised payments have not been received.[179] On the other hand, local companies and authorities can use conscription as a way to reduce the unemployment as coal production declines. The technology-import sanctions may have the opposite impact, however, as they delay the planned technological developments aimed at improving labour productivity, and thus reducing the labour force.[180]

It is difficult to predict how the situation will unfold, but explanations that recently unemployed coal sector employees will easily find other work, or that phase-outs will coincide with retirement, seem improbable. The Kemerovo coal-sector labour force is relatively young, 54% under 40 years of age.[181] However, early retirement is available for some employees, depending on their years of service and qualifications. Moreover, efforts have been made by the coal companies to offer additional training: 34% of employees are reported to have used this opportunity.[182] The only direct measure under the Coal Development Programme to address the declining number of jobs concerns the 1.5 billion rubles (about 20 million USD) earmarked developing a system of additional professional education for coal industry workers.

Despite retraining efforts, it may be difficult for workers to find similarly competitive salaries, as the coal sector provides comparatively high wages. For example, while the average monthly accrued salary in Kuzbass in May 2022 was 15.4% higher than in the same period in 2021, coal miners' salaries increased by 29.2%.[183] In Russia more broadly, the average monthly salary in May increased by 10%.[184]

However, the job market in Kuzbass is volatile, and depends on exports. Between 2008 and 2018, 18,000 new jobs were created in new coal mines in Kuzbass. By 2022, high salaries, the low unemployment rate and proactive policies by Governor Tsivilev aimed at diversifying the regional economy ought to have created an atmosphere of stability, minimizing the number of people leaving the region. Motives to migrate include the severe climate, unhealthy environment and uncertain future of the coal industry; the Centre for Strategies Research[185] found that 60% of employees of coal companies planned to change their field of work.

175. AVTOVAZ automobile factory in Izhevsk, where, after several salary cuts, highly qualified workers of the idle automobile factory had a choice: either to do low-paid work (painting walls, mowing lawns, picking up trash) or resign at their own request with five paychecks. Alekseev, D (2022) 'Growing underemployment' .The State Duma is preparing new bills related to the increase in benefits. Izvestiya 17 August 2022. https://iz.ru/1380522/dmitrii-alekseev/rost-nepolnoi-zaniatosti-kto-iz-ministrov-prav-v-prognozakh-o-bezrabotitce.
176. Thompson, L (2002) Russia: Bank Assistance for Social Protection. The World Bank Operations Evaluation Department. The World Bank.
177. Kemerovo News (2022). Fifth group of mobilized Kuzbass residents to the training center. URL: http://kemerovo-news.net/society/2022/10/01/84846.html (in Russian).
178. NGS42 (2022).' 'I don't know what will happen next': stories of Kuzbass families affected by partial mobilization. URL: https://ngs42.ru/text/gorod/2022/09/29/71693789/ (in Russian).
179. Lister, T, Krebs, K and Graham-Yooll, A (2022) Anger on the front lines and anxiety at home as Russia's mobilization is mired in problems, CNN 17 November, https://edition.cnn.com/2022/11/17/europe/russia-soldiers-desert-battlefield-intl-cmd/index.html.
180. Roshkov, A, Voskoboinik, M (2018) Trends and prospects for the long-term development of the Russian coal industry in the new technical and economic realities of the 21st century source, Mining Industry 2 (138), https://mining-media.ru/ru/article/economic/13668-tendentsii-i-perspektivy-dolgosrochnogo-razvitiya-ugolnoj-promyshlennosti-rossii-v-novykh-tekhniko-ekonomicheskikh-realiyakh-xxi-veka (in Russian).
181. Territorial body of the Federal State Statistics Service for the Kemerovo region (2020) To the day of the miner! The labor market and employment of the population. Federal State Statistics Service, 26 August.URL: https://kemerovostat.gks.ru/folder/95026.
182. Center for Strategic Research (2020) Prospects for the development of the coal industry in Russia export potential, financial situation, socio-economic effects, Center for Socio-Economic Research, https://www.csr.ru/upload/iblock/fd6/fd69a69529035a5127eb498dfcc7d565.pdf (In Russian).
183. Federal State Statistics Service in Kemerovo region – Kuzbass (2022). Socio-economic situation of the Kemerovo region - Kuzbass. URL: https://kemerovostat.gks.ru/storage/mediabank/DOCK_06.pdf (in Russian).
184. Federal State Statistics Service (2022). Socio-economic situation of Russia. URL: https://gks.ru/bgd/regl/b22_01/Main.htm (in Russian).
185. Center for Strategic Research (2020) Prospects for the development of the coal industry in Russia export potential, financial situation, socio-economic effects, Center for Socio-Economic Research, https://www.csr.ru/upload/iblock/fd6/fd69a69529035a5127eb498dfcc7d565.pdf (In Russian).

Workers realize that jobs in Kemerovo, despite efforts at diversification, cannot support the high number of laid-off workers, many of whom may lack the qualifications necessary to change profession.[186] Moreover, workers are seeking safer opportunities as violations of labour-safety rules reached record levels in Kuzbass in 2022. For example, in July and September, the Siberian Department of Rostekhnadzor suspended operations in several coal mines in Kuzbass because of excessive methane, poorly enforced safety, inadequate ventilation, and employee injuries.[187]

**BENEFITS FOR COAL-SECTOR EMPLOYEES**

- accident insurance, non-state pension provision, corporate personal insurance system
- health improvement and sanatorium treatment for employees and their families
- assistance to veterans and pensioners
- provision of free coal rations to pensioners and others enjoying this right
- assistance to the victims of work accidents / occupational diseases and their families
- other social benefits and guarantees

Source: Russian government (2020).

## 5.4 ROLE OF COAL COMPANIES IN MITIGATING SOCIO-ECONOMIC IMPACTS

The Development Programme for the Russian Coal Industry from 2035 includes measures for social support for retired workers. This includes free coal for personal consumption and a pension (7.03 billion RUR) as well as local development programmes aimed at creating alternative jobs in coal towns (24.77 billion RUR).[188] However, the Russian Social Security System no longer re-settles workers out of coal mining towns, an arrangement that had supported housing, transport, and re-employment in the 1990s.[189] The general federal social security system provides some benefits, but these are minimal.

In addition, the Coal Development Programme spent 8.1 billion rubles on social support for 2019–2035, especially by the private sector, to build social facilities like schools and hospitals in coal towns. All major coal producers in Kuzbass sign annual commitments with the Kemerovo regional government to support socio-economic development programmes and projects to secure employment and create new jobs and social guarantees. They are also obliged to finance communal heating and other services, social facilities and to invest in regional and municipal projects, including scientific and educational programs.[190] As social costs of the sector are largely covered by the coal companies,[191] their performance and liquidity are central issues. The year 2021 saw a historical increase in global coal prices, which strongly supported the economic performance of Kuzbass coal companies. Thus, the impact of declining exports during 2022 is likely to be offset by the higher international prices in terms of profitability in case of many companies. However, this would probably be temporary, as Russian coal has been sold for significant discounts recently and transportation costs are growing (see section 3), and the social costs may become more burdensome to the companies when profits decline.[192]

186. Number and need of organizations for employees among professional groups in the Kemerovo region, Territorial body of the Federal State Statistics Service for the Kemerovo region. URL: https://kemerovostat.gks.ru/folder/95026 (in Russian).
187. Prokopievsk. Ru (2022). A record number of violations are registered at Kuzbass mines. URL: https://prokopievsk.ru/news/dosug/na-shakhtakh-kuzbassa-registriruyut-rekordnoe-koli (in Russian). NGS42 (2022).'A record number of violations': Rostekhnadzor stopped work in the mines of Kuzbass 12 times a week. URL: https://ngs42.ru/text/incidents/2022/07/21/71506166/ URL: https://ngs42.ru/text/incidents/2022/07/21/71506166/ (in Russian).
188. In Kuzbass, 13,000 new jobs will be available in alternative sectors in this period due to budget spendings and investments: TASS (2021). The Kuzbass development program will create 13 thousand jobs in the non-resource sector. URL: https://tass.ru/ekonomika/10849653 (in Russian).
189. See, e.g., Decree of the Russian Government of 25 December 1993, N 1351: 'On the liquidation of the "Khalmer-Yu" mine of the "Vorkutaugol" production association and measures of social protection of the population of the vilage of Khalmer-Yu of the Republic of Komi' https://rulaws.ru/goverment/Postanovlenie-Pravitelstva-RF-ot-25.12.1993-N-1351/ (in Russian).
190. Sedykh N., Tchaikovskaya I., Social Responsibility of Coal Enterprises. Economics and Innovation Management. 1, 2021, pp. 74–83.
191. The Russian Government (2020) Programme for coal industry development in Russia for the period up to 2035. URL: http://government.ru/docs/39871/http://government.ru/docs/39871/ (in Russian).
192. TASS (2022). The budget deficit of Kuzbass in 2023 will compensate for the reserves accumulated by the region. URL: https://tass.ru/ekonomika/16206395 (in Russian).

# 6. SCENARIOS EXPLORING THE FUTURE IMPACT OF SANCTIONS ON COAL REGIONS AND RUSSIAN EMISSIONS

Various future development paths could be envisaged for the Russian coal industry; moreover, the Russian war in Ukraine causes major disruptions that must be factored in. Here we envisage three scenarios until 2030:

- **Reference scenario:** Albeit unrealistic, this 'no-war' scenario shows how the coal industry could have developed without the war. Investments in the coal sector would keep rising, exports to Europe and Asia would increase, and domestic coal consumption would retain business as usual (BAU) level following the last two decades, and technologies, equipment and relevant services by foreign suppliers would be available further on. The global decarbonization trend would continue, but its major impact on the Russian coal industry would not be expected by 2030.

- **'Soft' scenario:** Under this scenario the sanctions and related changes play an important role affecting the Russian coal industry. However, coal companies find ways to overcome the barriers and restrictions, while the sanctions-imposing countries fail to control compliance fully, in turn weakening the pressure on Russian coal companies. Exports through Russia's European ports would continue and no sanctions on the insurance of coal transport would be imposed; thus, the impacts of decline in Asian transit would not affect exports so dramatically.

- **'Hard' scenario:** This scenario assumes high compliance with strict, well controlled sanctions. Parallel imports of equipment and technologies (importing Western-made items via third countries) is eliminated by secondary sanctions set for alternative suppliers. Export is highly restricted due to transport bottlenecks and limited demand in China and other Asian countries. This scenario indicates a deep impact on the Russian coal sector based on what we know of ongoing and envisaged measures.

The main difference between the soft and hard scenarios concerns the adaptability of the Russian coal sector actors to the sanctions, which determines the severity of the impacts felt. In the 'soft' scenario, the initial shocks resulting from banning imports to Europe and other countries is expected to be overcome in a few years, by finding alternative buyers, means and routes for coal exports, financial resources, suppliers of technologies, etc. This scenario also assumes a weakening of sanction pressures due to the internal political and economic situation in the EU and other countries, with the absence or low impact of the secondary sanctions, and successful expansion of Russian coal exporters in the markets of China, India, Turkey and other countries.

The 'hard' scenario implies a much stronger impact of sanction shocks over a longer period. The adaptation efforts of the Russian coal producers and traders are here expected to encounter greater pressures on coal imports in and through Europe, limited growth or reduction of 'toxic' Russian coal supplies to alternative markets, and higher risks of secondary sanctions to suppliers of equipment, technologies, materials, etc. This scenario also concerns the increasing domestic problems of coal transport due to competition for railway capacity and logistics, lack of internal financial resources, limited state support to the coal industry due to increasing expenditures on the military needs, and rising social pressure due to losses of corporate revenues, coal production levels, demand for services in related sectors, and the decline in local tax revenues.

The 'hardness' of this scenario is determined by our understanding and vision of the implementation of sanctions and the capacity of the Russian coal and related sectors to overcome the shocks. Of course, there could be many alternative assessments of the strength of potential future sanctions, even leading to total degradation of the Russian coal industry, but thus far we have not observed the political will in the sanctioning countries to initiate extreme scenarios that could destroy the Russian coal sector. However, depending on the developments of the ongoing war, the situation may be re-evaluated by the coalition supporting Ukraine.

We divided our scenario work on Kuzbass coal sector into two: comprehensive qualitative scenarios (see Table 8), and less in-depth

# 6. SCENARIOS EXPLORING THE FUTURE IMPACT OF SANCTIONS ON COAL REGIONS AND RUSSIAN EMISSIONS

quantitative scenarios. The quantitative scenarios could not be equally detailed, due to the lack of data and uncertainties related to rapid developments in the Russian economy. However, the same approach and background assumptions were used to guide both analyses.

Table 8. Soft and hard scenarios, coal industry development in Russia by 2030

| Parameters | Soft scenario (BAU at the time of writing) | Hard scenario |
|---|---|---|
| **1. General economic performance of Russia, GDP growth**[193] | Ministry of Economy's 'fast adaptation' scenario: GDP falls by 8.3% by 2023 and exceeds 2021 level by 3.7% in 2030. Structural changes in the economy: share of export-oriented sectors declines while sectors oriented to domestic supplies rise. | Ministry of Economy's 'stress' scenario: severe drop in GDP: 11% in 2023, 11.9% in 2024; by 2030 GDP falls by 3.6% compared to 2021. Loss of oil and gas export (to Europe) revenues are not overcome, leading to fuel deficits in the domestic market. |
| **2. Strength of sanctions imposed on Russian coal and tied sectors** | Possible softening but not discontinuation of sanctions: gradual 'leaking' of the EU sanctions. Internal political pressures on energy sanctions against Russia. Weakening of import sanctions on coal and other fuels: EU does not re-introduce its lifted ban on transport of Russian coal from Russian ports in Europe. | Continuation / strengthening of pressure by other countries (insurance, transportation, tariffs); Japan beginning full coal embargo during 2023; total coal and coal transport embargo by the EU, oil and petroleum products import embargo by all EU countries, no leaks in significant reduction of EU gas supplies from Russia |
| **3. Domestic competition between fuels/ energy sources (gasification, heavy fuel oil (mazut) overproduction)** | Import of gas from Russia to EU continues at 20–25% of 2021 volumes.[194] Part of the mazut banned by the EU can be exported to other countries. Accelerated domestic gasification efforts by Gazprom[195] put on hold /delayed due to increased requirements of contributions to the state budget.[196] Domestic gas and mazut supplies replace only a small share of domestic coal consumption by 2030. | Gas and mazut cannot be exported as the EU market closes: gas production is limited, mazut overproduction requires domestic combustion. Accelerated domestic gasification efforts,[197] together with mazut use, lead to partial substitution of coal consumption by natural gas and mazut. |
| **4. Coal transport: railway bottlenecks, BAM and Trans-Siberia railways overloads, Amur River coal transport plans** | Strong pressure on Russian railways. Increasing cargo transport capacity, which enables coal exports to be reoriented to east by the main transport corridors. However, tariff increases[198] and longer transport routes for coal add to transport costs. The EU does not limit export of coal via Russian ports in Europe, and European companies provide transportation services for Russian coal suppliers to non-EU countries. Infrastructure for coal transportation is increased via Amur River to China. Regional development programmes focus on the Far East, Caucasus and Caspian areas regarding reorientation of transport flows. | Full ban on coal transport to Europe. Problems with transport logistics to China and India. Rail tariff reform to subsidize manufactured products over raw-materials is adopted,[199] export duty[200] and increasing competition over rail capacity with high-profit products. Lack of transport capacity hinders coal exports to Asia, as BAM and Trans-Siberian railways are overloaded. Increased competition of Kuzbass with other coal-producing regions (Eastern Siberia and Russian Far East) for export routes. Amur River coal transport not feasible by 2030, due to high costs. |
| **5. Insurance of coal transportation** | The EU does not impose restrictions on insurance of coal export from Russia. Insurance costs rise, but not significantly. | Increasing problems with cargo transport insurance to West and East for Russian coal, especially marine transport. The EU, other European countries and the USA ban insurance of Russian coal transport. and Russian domestic insurance schemes are not internationally recognized.[201] The costs of transportation insurance rise significantly. |

193. Frunznews 6 September, The Ministry of Economic Development has prepared scenarios for the development of the Russian economy until 2030, URL: http://www.frunznews.ru/news/2022-09-06/minekonomrazvitiya-podgotovilo-stsenarii-razvitiya-ekonomiki-rossii-do-2030-g/ (In Russian); Batyrov, T (2022) Reshetnikov spoke about the "all the fears of the world" scenario for the Russian economy, Forbes 6 September, URL: https://www.forbes.ru/finansy/476311-resetnikov-rasskazal-o-scenarii-vse-strahi-mira-dla-rossijskoj-ekonomiki (In Russian) Bloomberg 5 September 2022, Russia Privately Warns of Deep and Prolonged Economic Damage, URL: https://www.bloomberg.com/news/articles/2022-09-05/russia-risks-bigger-longer-sanctions-hit-internal-report-warns.
194. https://www.statista.com/statistics/1331770/eu-gas-imports-from-russia-by-route/.
195. Kalashnikov, V (2022) Sanctions will help the North-West of Russia, *Kommersant*, 6 May, URL: https://www.kommersant.ru/doc/5340778 (In Russian); *Kommersant* 17 June 2022, Novosibirsk Region and Gazprom doubled the number of settlements in the Region's Gasification Program, URL: https://www.kommersant.ru/doc/5421219 (In Russian).
196. Dyatel, T (2022) Single gas tax increase, Kommersant 21 June. URL: https://www.kommersant.ru/doc/5423254 (In Russian).
197. Kalashnikov, V (2022) Sanctions will help the North-West of Russia, Kommersant 6 May, URL: https://www.kommersant.ru/doc/5340778 (In Russian); *Kommersant* 17 June 2022, Novosibirsk Region and Gazprom Doubled the Number of Settlements in the Region's Gasification Program, URL: https://www.kommersant.ru/doc/5421219 (In Russian).
198. The Coal Hub (2022) Russian government to introduce coal export duty, URL: https://thecoalhub.com/russian-government-to-introduce-coal-export-duty.html.
199. Ibid.
200. Sazanov, A (2022) The Cabinet of Ministers of the Russian Federation decided not to introduce export duties on coal from January, Interfax 15 November (in Russian), https://www.interfax.ru/business/872509.
201. This has been the problem with shipping oil: *Ukrainian Shipping Magazine* (2022) China does not recognize Russian ship insurance, 30 November, URL: https://en.usm.media/china-does-not-recognize-russian-ship-insurance/.

# 6. SCENARIOS EXPLORING THE FUTURE IMPACT OF SANCTIONS ON COAL REGIONS AND RUSSIAN EMISSIONS

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|---|---|---|
| **6. Restrictions on supplies of technologies, equipment, services, software to Russian coal industry** | Existing stocks of equipment are sufficient for several years to come. In the longer term, 'parallel' import via non-sanctioned countries becomes available. Regardless of declining quality of equipment and services, performance remains fairly good. | Degradation of technologies due to lack of equipment supplies, proper services and software updates. Limited or no access to alternative supplies of equipment and materials as further sanctions are imposed by the EU to close the loopholes on 'parallel' import.[202] Suppliers fear secondary sanctions. Increasing problems with technological failures and disturbances. Rising costs of technological maintenance. |
| **7. Divestment from coal industry, lack of capital** | Domestic public and private financing of coal projects continues, despite significant risks of financial losses due to divestments by foreign and other investors. No significant impact on the financial situation for coal industries. Accumulated resources and state support sufficient for further development. Soft loans and large-scale project financing by the government and development institutions. | Declining revenues of coal companies, state support and subsidies. Cost of capital increases due to inflation and lack of access to foreign capital markets. |
| **8. Carbon and environmental regulation** | Asian coal markets postpone their measures related to pledged coal phase-outs beyond 2030. No carbon pricing affects Russian coal suppliers. | Asian coal markets start measures related to their pledged coal phase-outs before 2030. |
| **9. Demand for Russian coal exports** | Continuation of relatively high demand in China; other Asian countries continue or increase their purchase of Russian coal because of major discounts. | Demand in the Asian and other markets for Russian coal declines due to domestic policies and approaches aimed at avoiding energy dependence on Russia. |
| **10. Social commitments of Kuzbass coal companies** | Kuzbass region retains some export orientation; moderate out-migration, military drafting reduces workforce to match declining employment in the coal sector, some coal mining jobs become seasonal, government can afford to maintain social security benefits, coal companies use accumulated wealth and profits to comply with their social obligations. | Kuzbass becomes a 'typical' Russian region based on domestic demand for coal and other products as exports decline further and competition over rail transport reduce coal exports. Living standards and number of well-paid coal mining jobs decline, significant out-migration, government and coal companies use funds to maintain social security system. Military drafting increases, affecting local workforce, family economies and social capital. |
| **11. Coal prices** | Domestic coal prices are relatively stable and lower than export prices (in the range of 80-100 USD/t). The prices in world coal market are declining from high levels of about 300-400 USD/t in 2022 to 100 USD/t in 2023 and onwards. | Domestic coal prices remain relatively stable, ca 50–100 USD/t. Prices on the world coal market gradually declining from 300–400 USD/t in 2022 to 60 USD/t in 2026 and onwards. |

Guided by these mostly qualitative assumptions, our quantitative scenario analysis projects the consequences of the impacts of sanctions on the Kuzbass economy by applying a simple regional economic model. We quantify the regional impacts on Kuzbass coal production, revenues, employment, and methane emissions. We apply a demand-driven model, which means that the underlying assumptions about future demand drive the production of coal in Kuzbass. Future domestic demand for Kuzbass coal is assumed to be driven by Russia's economy-wide growth measured in GDP. Using Russia's GDP as a scaling factor for domestic demand for coal enables us to capture the cascading effects of cross-sectoral dependencies. Sanctions imposed on the Russian economy will adversely affect many sectors, including electricity-intensive ones, leading to lower demand for electricity, and thus, coal. We assume no export of coal from Kuzbass to the EU beyond 2022. Exports of coal to non-EU countries (mostly Asia) are determined by coal import trends in 2022 and stated energy policies specific to coal as well as limitations to transport capacity as a result of competition between export products. For instance, under 'a hard' scenario, we assume that exports of coal from Kuzbass to Asia will decline by 20% annually, due mainly to China's efforts to reduce import dependence by increasing domestic supply of coal. Also declining coal prices together with discounts to Russian export prices and growing transport costs are assumed to reduce the profitability of coal exports from Kuzbass. The resultant changes in total production of coal in Kuzbass are used to calculate the impact on employment and revenues.

In the reference ('no war') scenario, coal production in the region remains fairly stable, 2022 to 2030 (Figure 20). In the 'soft' scenario, coal production drops by 28% in 2023 and by 36% in 2026 (compared to 2022), later stabilizing till 2030. In the 'hard' scenario, coal production declines by 31% in 2023 and by 49% in 2026 (compared to 2022), later stabilizing till 2030.

202. Ong, D (2023) EU's 10th round of Russian sanctions would affect countries helping Putin: von der Leyen, *International Business Times*, 17 January, https://www.ibtimes.com/eus-10th-round-russian-sanctions-would-affect-countries-helping-putin-von-der-leyen-3658113.

# 6. SCENARIOS EXPLORING THE FUTURE IMPACT OF SANCTIONS ON COAL REGIONS AND RUSSIAN EMISSIONS

In 2022, coal production declined only by 8% as domestic demand was untypically high due to low hydro power generation and excess production could be used to fill up coal storages. These factors losing importance and profitability of exports declining likely lead to a further drop in 2023.

Annual revenues from Kuzbass coal production and domestic and export supplies fall by approximately 25% in the reference scenario in 2023 and onwards till 2030 compared to the 2022 level (Fig. 21) due to normalisation of coal price after the 2021-22 peak price levels. By contrast, in the 'soft' scenario, revenues drop by 40% in 2023 and about 60% from 2024–2030 (compared to 2022). In the 'hard' scenario, revenue decline may reach 57% in 2023, 67% in 2024 and about 75% from 2026–2030 (compared to 2022). Here the drops account for assumed price level of USD 60-100 per tonne and relate to the profitability of exports.

In the reference scenario until 2030 (Figure 22), employment in Kuzbass coal sector is expected to be rather stable. In the 'soft' scenario, employment falls by 26% in 2023 and by 28% by 2026 (compared to 2022), stabilizing thereafter until 2030. In the 'hard' scenario, employment drops by 34% in 2023 and by 49% by 2026 (compared to 2022), stabilizing thereafter until 2030. Declining coal production, in particular in the labour-intensive underground mines, explains falling de facto employment, however, as outlined above, this is unlikely to be reflected in official statistics at least in short term. Russian companies face administrative pressure to avoid dismissals of employees, which leads to grey unemployment, i.e. maintaining employees on a minimum salary instead of laying them off.

In the reference scenario, methane emissions from the Kuzbass coal sector remain fairly stable until 2030 (Figure 23). In the 'soft' scenario, emissions fall by 27% in 2023 and by 36% in 2026 (compared to 2022), then stabilizing until 2030. In the 'hard' scenario, emissions drop by 31% in 2023 and by 49% by 2026 (compared to 2022), then stabilizing until 2030.

Figure 20. Scenario projections of total coal production in Kuzbass (2022=100%), 2022–2030

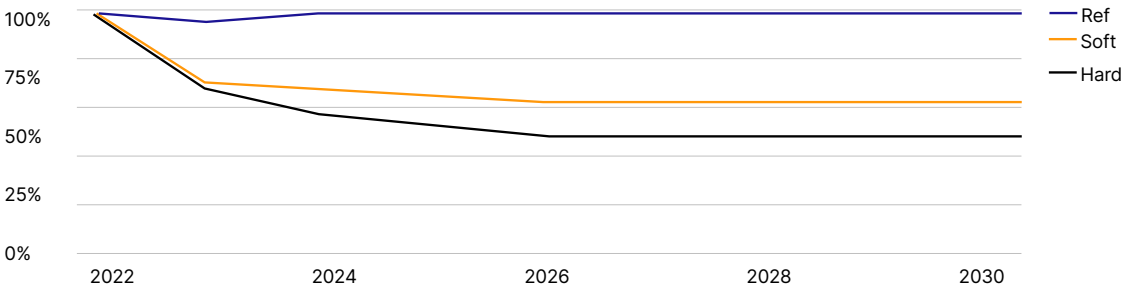
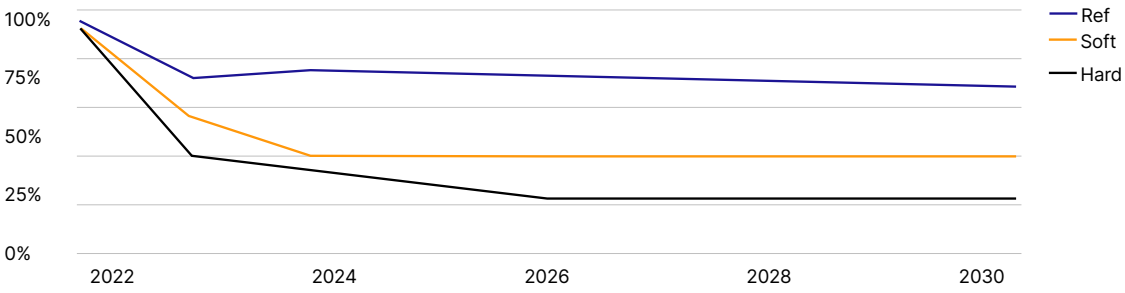



Figure 21. Scenario projections of revenues from Kuzbass coal production, 2022–2030 (2022=100%).



# 6. SCENARIOS EXPLORING THE FUTURE IMPACT OF SANCTIONS ON COAL REGIONS AND RUSSIAN EMISSIONS

Figure 22. Scenario projections of employment, Kuzbass region coal sector, 2022–2030

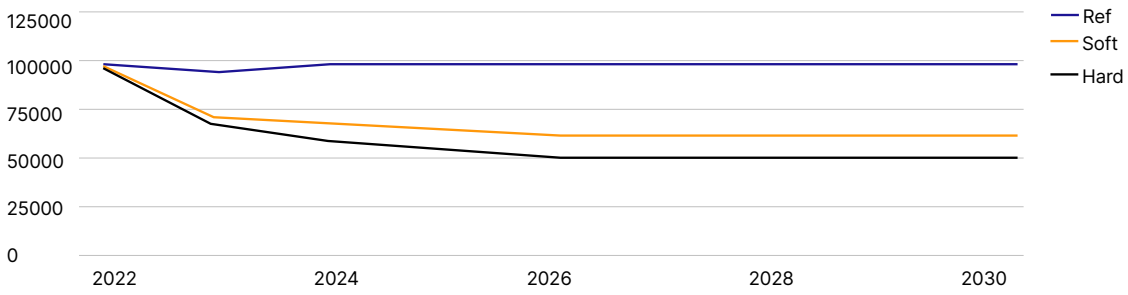
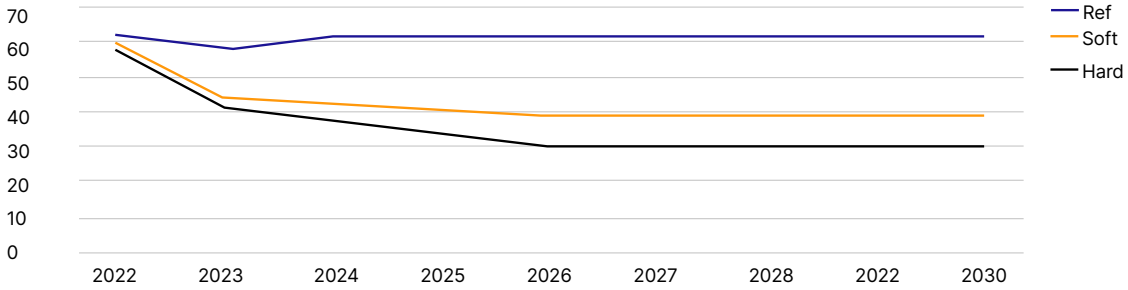



Figure 23. Scenario projections of methane emissions, Kuzbass region coal sector, $MtCO_2e$ per year, 2022–2030




Our calculations show that the sanctions and other related factors will significantly affect the Kuzbass economy. Total production of coal in the region during 2022–2030 may decline by 28% ('soft' scenario) or 38% ('hard' scenario), compared with the reference ('no war') scenario. Moreover, total revenues from domestic and export coal supplies in 2023–2030 may drop by 49% ('soft' scenario) and by 51% ('hard' scenario) compared with the reference scenario. As the coal sector typically provides from 19% to 36% of gross regional domestic product, the shock of such revenue losses will affect the regional economy, and may lead to a dramatic fall in employment: by 2030, 36% of jobs in the coal industry could be lost in 'soft' scenario and up to 49% in 'hard' scenario compared to the reference scenario. There are historical memories of such social shocks in Russia: the economic crisis of the mid-1990s resulted in a more than three-fold loss of jobs in the coal sector, leading to social unrest and political turmoil. Similar effects may be observed in Kuzbass if economic degradation should become as rapid and overwhelming as described in the 'hard' scenario.

Attempts to diversify the Kuzbass economy and gradually switch from deep dependency on coal production did not prove successful in recent decades. Initiatives like those taken by the Russian government and regional authorities to expand activities in other sectors (like energy and transport infrastructure, logistical centres, new metallurgical production and others) do not seem realistic in the current economic and political context – making the social and economic impacts of crisis in the coal sector very difficult to mitigate.

On the other hand, a slower pace of coal extraction and combustion in the region will bring environmental and climate benefits. If the new open-pit coal mines were to be postponed, that would impose fewer impacts on the local ecosystems. Reduced use of coal for power and heat generation would' improve air quality and probably reduce health risks for local population. Emissions of $CO_2$ from coal combustion would also decline, as well as methane emissions from coal mining, helping to mitigate climate change. However, these benefits are unlikely to prove sustainable in the longer term unless the Kuzbass economy can undertake the essential transformation towards a very different, green and low-carbon model.

# 7. CONCLUSIONS

**The events of 24 February 2022 marked a milestone: the emergence of a totally new reality for the Russian economy – in particular, for Kuzbass coal industry and the related sectors. The country and the region were not prepared for the turmoil surrounding the war in Ukraine; there came sanctions on key sectors including exports of coal, oil and industrial products, a ban on imports of modern technologies and services, and an unprecedented outflow of investors from the country.**

From our analyses of statistical data, and the views of governmental officials, experts and businesses, we can conclude that post-February 2022 trends have shown significant drops in production, domestic and export supplies of coal from Kuzbass. Coal exports from Kuzbass declined by 14% while the equivalent figure for the federal level was only 7.6%, and coal production in Kuzbass declined by 8% but increase on the federal level by 0.4%.[203] Revenue losses will have severe short- and long-term consequences for the regional economy, as the coal sector contributes some 19–26% of regional GDP and has substantial impact on linked sectors like power and heat generation, metallurgy, transportation, infrastructure, communal services and many others. Such heavy dependency on coal, coupled with insufficient transport capacity to alternative markets, makes Kuzbass more vulnerable than many other coal regions of Russia.

Job losses and declining standards of living in Kuzbass if the economic situation does not change in the foreseeable future could lead to social unrest. The experience of the 1990s in Russia showed that coal miners can become a highly influential force for political change. The consequences may be similar at the regional level in the coming years, if the scale of losses proves comparable, as per the 'hard' scenario: approximately 50% decline of coal production, 75% loss of revenues, 50% loss of jobs.

Coal producers and Russian policymakers alike are seeking ways to reduce the impacts of sanctions, and to resolve internal problems (with transport, other logistics) and redirect exports towards 'friendly' countries – even at great expense (rising production costs, big discounts to coal export price, huge transport costs, etc.). The effects of such actions will depend on many factors, some of which relate to the strength and soundness of the West in pursuing its goals of tightening Russia's economic situation and reducing the revenues partly financing the war in Ukraine. If the EU and partners fail to prevent leakage of Russian coal and other export products to third countries, and Russia continues to receive significant revenues in hard currency, the technological restrictions would be eased, or access to financial resources of the West would be softened – and the preconditions for the 'soft' scenario would appear.

Today, the Kuzbass coal sector finds itself at a crossroads. Impressive plans for launching many new mines to raise coal production by over 25% in the near term and modernization of existing facilities are highly risky in such an uncertain situation: sufficient demand is lacking. Although previous years yielded big incomes, the revenue losses expected for the coming years curb the appetite of coal companies to spend on business projects and on social programmes which they had agreed to finance in the region. Avoiding the negative impacts of collapsing demand for coal has not been resolved and seems unlikely: rescuing the coal companies is not a priority for the federal government. It is concentrating on more important challenges, such as the Ukraine war, tensions with the West, and oil and gas exports.

In summary, what could be expected in these circumstances in Kuzbass?

203. Tass (2023) Russia's coal production rises by 0.4% to 437 mln tons in 2022, 1 February, https://tass.com/economy/1570227; The Coal Hub (2022), Coal production in Kuzbass down 8% in 2022, https://thecoalhub.com/coal-production-in-kuzbass-down-8-in-2022.html.

# 7. CONCLUSIONS

- The region will not be able to return to pre-war normality; standard of living will fall considerably in the next few years. This may pose risks of social unrest, which can be mitigated by repression and drafting of the most active young people to the war.

- Coal production cannot regain the pre-war levels until 2030 at the earliest: most of the coal produced was exported, and there is unlikely to be demand in non-EU markets on a scale like previous coal exports to the EU.

- Coal revenues will decline further along with the profitability of coal supplies for export, due to the stabilizing world coal markets and prices after 2022 energy shock, the rising costs of production, transportation and major discounts by Russian coal exporters.

- It is unlikely that the West will substantially weaken its sanctions on Russia, including pressure on coal. However, decisions to allow transport of Russian coal to continue via European waters, coupled with the absence of a ban on insurance of coal marine transit, create opportunities for Russia's coal companies to lessen the negative impacts of transportation problems in the Eastern direction – even though the current decline of global coal prices together with the major discounts offered by Russian companies are already making it unprofitable to use Russia's European ports. Banning EU and Norwegian shipping companies and insurers from supporting the Russian coal trade would significantly increase the risks and costs of Russian coal transport. As of July 2022, 62% of ships carrying Russian fossil fuels were owned by EU companies, and 73% were insured by British and Norwegian companies.[204]

- Global consumption of coal is expected to decline in the longer term, due to increasingly stronger environmental and carbon policies and regulations. Kuzbass and Russian coal producers are simply not prepared for the consequences of the green energy transition, as they have demonstrated clearly in recent decades. They have focused on lobbying against regulation of carbon emissions and pollution in Russia and abroad, instead of finding the ways to adopt to the coming zero-emission future.

- The ongoing and expected further depression and degradation of the Kuzbass coal industry also has positive aspects, related to reduction of GHG emissions. Less production of coal leads to less emissions of methane from coal mines; and less power and heat generation means less $CO_2$ emissions from coal combustion.

  The Kuzbass coal sector seems to be approaching our 'hard' scenario, with numerous negative consequences for the regional economy, employment and local incomes – but also with some potentially positive environmental changes and lower carbon emissions. In conclusion, much will depend on the firmness of the West to resolve the Ukrainian war crisis, which has a much broader, pan-European, and even global context.

204 Center for Energy and Clean Air (2022) Financing Putin's war: Fossil fuel exports from Russia in the first six months of the invasion of Ukraine. URL: https://energyandcleanair.org/publication/financing-putins-war-fossil-fuel-exports-from-russia-in-the-first-six-months-of-the-invasion-of-ukraine/.

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